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DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS AND RELATED DISABILITIES

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UDK: 621.314:621.382.3(043.3)

Abstract

This thesis represents the structure for develop at the executive project level the design of a new building destined for residence for people affected by cerebral palsy and related disabilities.

It is important to know the different steps that are necessary to follow to construct an entire building taking account how to evaluate the capacity of every installation and the methods to know this capacity.

The methodology to write this document is to describe the theoretical part to design every installation and after that, calculate the results of each installation in this specific project.

There is a procedure to calculate every installation. First it is necessary to introduce it, then describe the Standards regulation and write the conditions to take account in every case (interior and exterior conditions, size of rooms and situation of the building, etc.).

When these conditions are clear, the next step is to calculate the number of units and the needed power to develop every installation. Each one has a concrete method to

take this number. For example, calculate the size and numbers of pumps, taking account the flow of water it is necessary to distribute or calculate the number of air-conditioning units and ventilators, considering the thermal loads of every room.

After successful verification of these units, it is necessary to know the electrical consumption of each one to know the electrical supply needed for the building in order to describe the different sources installed.

It is necessary to distribute the electrical power in different lines for every floor. For that, it has been installed 16 distribution panels to supply all the electrical necessities of the building.

After having all the theoretical and practical results of the installations, the next step is to draw the plans to show schematically the final structure.

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1. INTRODUCTION

1.1. Motivation

The project aims to reflect the steps to be followed for the total construction of a building, adding the complexity of adapting the installations to people with cerebral palsy.

This building aims to create a space where these people feel fully integrated and with all the facilities to have a life as easy as possible.

My motivation derives from the need to include these people in our society so that they can feel welcomed and that they can do everything they want while they don't have the same opportunities as other people.

Our job is to make them feel that they are part of our society and introduce them to the day to day of the city.

It would be vitally important that most buildings have the facilities so that these people could live there. It is clear that they need special care and they are not completely autonomous but it is important to make them feel as less dependent as possible.

I would like to show that it is not that difficult to build a building that suits these needs since the part of the installations is practically the same for all buildings.

On the other hand, I would like to emphasize that it is important to build buildings of this style in all parts of the world since my intention is to create a space where these people can meet and be cared by professionals, in a space different from a hospital.

Basically, the idea is to create a building with large spaces so that they do not feel locked and have mobility for the wheelchair and with lots of light. There is a courtyard to perform activities and also go out in free time. Rooms to do various activities both playful and therapy and some rooms with all kinds of amenities adapted to their needs.

Another motivation of the project comes from the intention to be capable to build an entire building and understand all the procedures that are necessary to follow.

It is important to know all the steps to bring to reality all the theoretical concepts studied in the engineering career and to know all the different areas that an engineer can reach.

1.2. History of building

The project develops a residency program for people with psychic diminution in a place that, on the west side, is bounded by an Evangelical Church, whose building is intended to preserve the facade.

The urban classification of the plot and its dimensions have been subject to various modifications during the last years until the definitive approval by the Plenary of the Municipal Council dated July 20, 2007, of the "Special Urban Plan of definition and Specification of the building parameters of the equipment located on Carrer de Llull 163" [1].

The Special Plan was developed from the current Planning at that time, which it says:

- MPGM (Modification of the General Metropolitan Plan of Barcelona) for the renovation of industrial zones of Poblenou - District of activities 22 @ bcn, definitively approved dated July 27, 2000. The MPGM that defines the characteristics of the urban qualification 7 @ in articles 12, 13, 14, 15.

- PERI (Special Plans for Internal Reform) de l'Eix Llacuna definitively approved on October 25, 2002. PERI defines the urban classification of the plot as 22 @

- Plan for Urban Improvement for the Redistribution of the land for social housing and equipments derived from different planning instruments in the 22 @ approved area definitively on January 27, 2006. The Improvement Plan granted the urban classification 7 @ to the plot.

1.3. References

For the production of this project it has been necessary the collaboration of several sources that without them it would not have been possible to develop it.

In the first place, it is important to highlight all the information provided by the company I worked in Barcelona, which has provided me with the plans of the building.

On the other hand, all those sources that have developed projects of installations in buildings since I have been able to discover the process that must be followed to calculate the needs of the machinery in each case and specific space.

1.4. Goals

The large-scale objectives of my project are basically two.

First of all I would like to be able to discover the process for the construction of a building, see everything that is needed to carry it out and know everything that has to be taken into account for the design of the facilities in a building with a few specific characteristics.

Secondly, I would like to create a building that could meet the needs of this range of people to denounce the lack of this type of buildings in the cities and show that it is an economically viable and very important space.

Other objectives that trigger this project is the ability to learn how to carry out a project of these characteristics and learn to use engineering programs commonly used in companies.

1.5. Thesis outline

The distribution of the project has been divided into different chapters with the objective of easy reading and understanding of the concepts.

The first chapter is this one and tries to introduce the main concepts and objectives of the project based on the previous information used and shows a summary of what will be found along the pages of the work. Likewise, it shows the motivation for the

realization of a project with these characteristics and the past of the building in question.

The second chapter explains the descriptive part of the project, that is to say, the emplacement and conditions of the building. Also describes the architecture part of the building like the structural, surrounding, compartment and finishing system.

The third chapter describes the different installations carried out in the project that would be those of sanitation, plumbing, air conditioning and ventilation, electricity, lightning rods, telecommunications and fire protection.

In each of the installations, it is introduced the process to be followed for its sizing according to the appropriate standard regulations and then its characteristics are calculated to meet the needs of said building.

In the fourth chapter the conclusions reached after the work done are summarized.

In the fifth chapter, the different sources used to find the necessary information are shown.

The sixth chapter shows the plans made for this specific project of each of the installations to facilitate the understanding of the calculations made.

Finally the annexes are shown, a section where there are all the calculations made to reach the results obtained that are shown in the third chapter and in the plans.

The figure 1 shows a render of the future building that will be constructed for residence.

Figure 1. Photo of the building [2].

2. DESCRIPTIVE REPORT

In the following section it is explained the history of the building before this construction, the architectonical characteristics and the proposal diary use of it.

2.1. PREVIOUS INFORMATION

This chapter explains the goal of the building, his situation and the external buildings of the place.

2.1.1. Object of the project

The project is designed to develop at the executive project level the design of a new building destined for residence for people affected by cerebral palsy and related disabilities.

2.1.2. Emplacement

The location of the project is in the street Ramon Llull 163 in Poblenou, Barcelona. The plan GEN-01.1A shows the situation of the building.

The figure 2 shows a plan of the situation of the building in question.

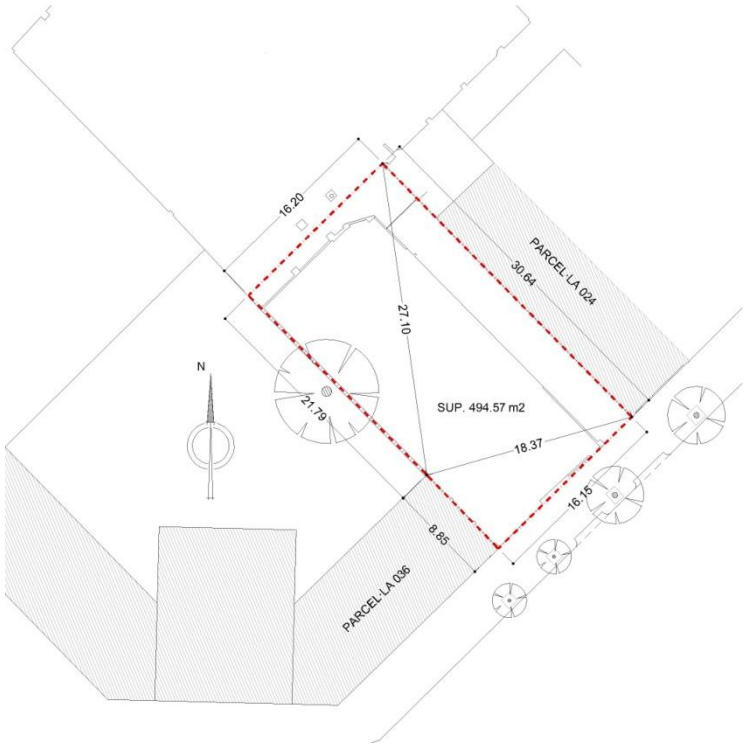

Figure 2. Plan of the plot of the house and the environment [2].

2.1.3. Conditions of building

The plot has a facade on Llull Street and the interior space of a qualified island of equipment, a part of which will be free space for the relationship between the different pieces of public and private facilities on the island. The plot has an area of about 494.57 m². The plot, with irregularly form, faces Llull street and the open space-yard of the island with a length of 16.15 m and 20.00, respectively. Topography is noticeably flat. The level on the sea level of the slopes of the existing streets is approximately +5.00 m. Regarding the contiguous buildings related to the equipment, the following can be commented:

- Plot 024: occupied at 80% for a building of LF + 5 and built depth of 24 m. It corresponds to the Eixample sector with urban qualification 13a.
- Plot 036: chamfer occupied 50% for a religious building of LF + 1, of approximate height 10 m, and a volumetric plant with a central body and two wings.

In the free space there are two large willows. In the figure 3 it has been shown the divided plots of this part of Barcelona district.

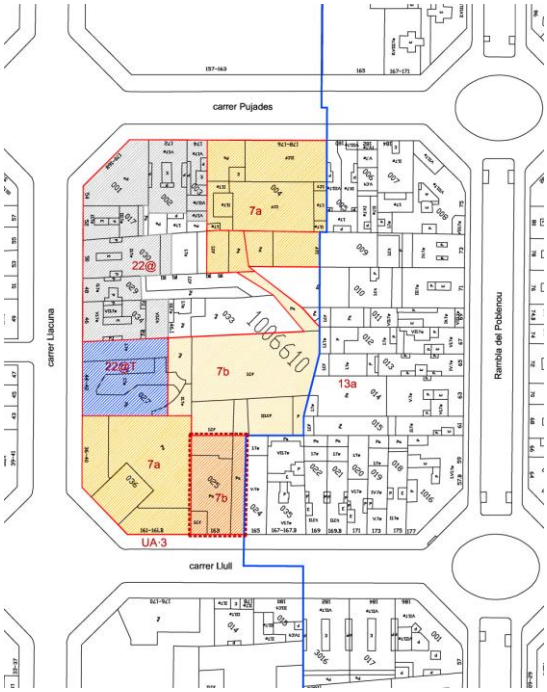

Figure 3. Plan of the plot of the house and the environment [2].

2.2. DESCRIPTION OF THE PROJECT

The next section describe the physical characteristics of the building, the architecture the building had been construct with and the use of every part of the building every day.

2.2.1. General description of the building

The new Home-Residence that will give vitality to its environment, both for its use and for the architectural proposal that in a compositional exercise of the facade literally explains its program:

It will be a ground floor open to the neighbourhood with a passage to the interior of the island, an intermediate floor for social use for the institution, and superior private floors of residence.

In all cases the main facades concentrate the common areas. The relationship that the building generates between the street and the interior of the island is of opened transition. It is projected a regular floor building with a volume of ground floor + 5 of 22 m approximately height and 3 m from the building adjacent to the southwest, Llull 161 is projected, with a lower extension occupying 3 m up to one height of 9.80 m [2]. The occupation of the building allows in the Ground Floor and P 1 the free passage of 4 meters wide and also a retreat from the depths of 20 meters that widens the passage opening the visuals to the patio of the island.

The plans ARQ-02 show different sections and elevations of the building so it is possible to understand better the distribution of the building and their measurements.

The figures 4 and 5 describe the measurements of the plant.

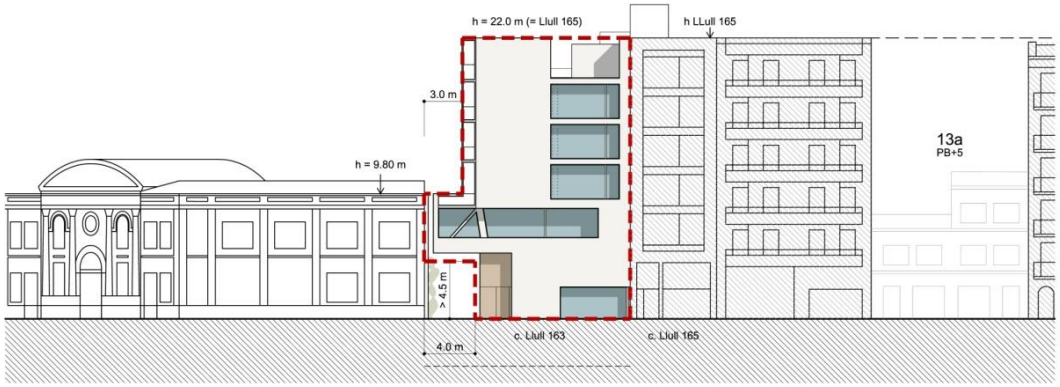

Figure 4. Raised of the building in Llull Street [2].

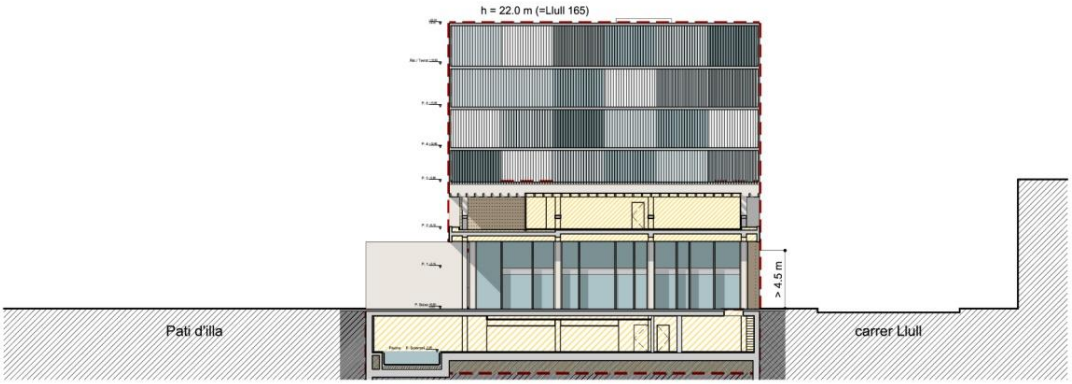

Figure 5. Section of the building in Llull street [2].

2.2.2. Structural system

The building consists of 7 floors – underground, ground floor + 5 floors. The main structure of the building is in-situ concrete complemented with metal structure. However, it consists of secondary metal substructures - cover, forged and facade -.

The forged of the building are solved with concrete slab (ground floor) and the rest with reticular forged. The underground floor is made with a perimeter wall with the realization of a foundation slab and at the same time it is made of sub-press slab since it is conveniently reached the level of the water table.

The reticular wound is made of lost cassettes (25 + 5) supported by concrete pillars and with a cantilever that is located on the second floor and which also requires the laying of a concrete tilt. The size of the structure provides for the execution of an additional plant.

The figure 6 shows a section of the structural system of the building.

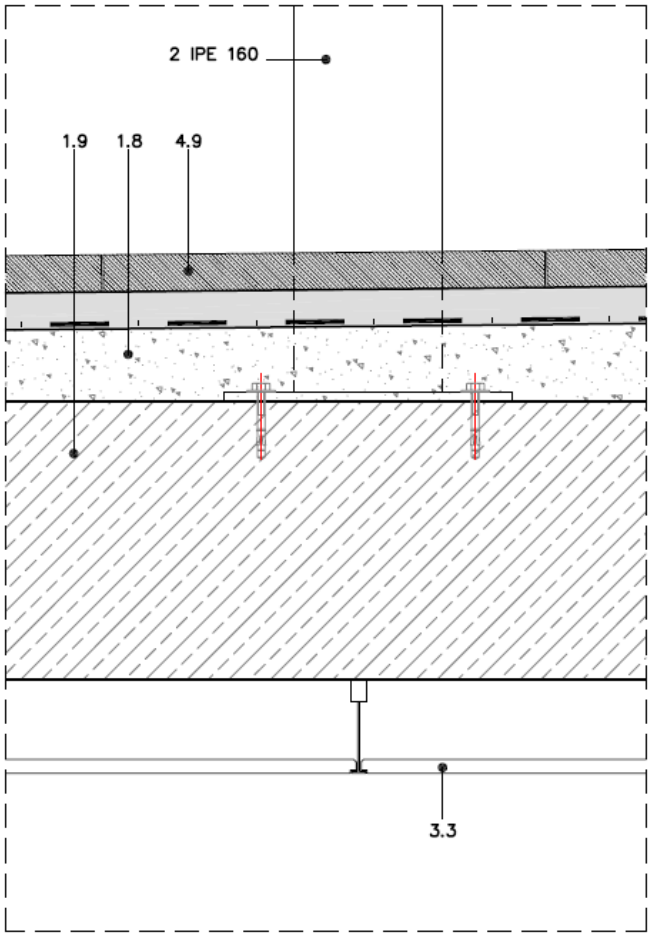

Figure 6. Section of the structural system of the building [2].

2.2.3. Surrounding system

The surrounding system consists of 25cm thick concrete in situ on the main and rear facade and 29x14x10 bricklaying perimeter walls, making 15cm thickness with anodized aluminium joinery and glazing with a thermal bridge break.

The side facade, which leads to the center of the island, is made of 29x14x10 brickwork walls, 15cm thick, with sandwich panels 4cm thick, aluminium anodized and glazed with broken Thermal bridge and as a sunscreen, a structure is constructed across the width and height of the facade of metallic structure coated with perforated galvanized steel sheet**.**

2.2.4. Compartment system

The interior partitions are made up of brick walls drilled in the formation of elevator cores and ladders and brick walls of 29x14x10cm in separate room of installations.

It will be used areas conformed by double plates of 15 + 15mm plaster with profile of galvanized steel of 90mm for a thickness of 15cm in separations between toilets and common spaces and between rooms. Also prefabricated modular walls for the formation of offices, glazed and blinds will be used.

2.2.5. Finishing system

On the ground floor, it will be used 20x20cm prefabricated concrete floor. On floors 40x40cm terrazzo will be placed on stairs and pieces of porcelain stoneware in common spaces and circulation ones. They will be non-slip in wet areas and in areas with the risk of falls. In the toilets and kitchen, 2.5 mm PVC flooring will be used, continuous on a levelling terrazzo base. In the rooms 2,5 mm linoleum floor will be used, continuous on a levelling terrazzo base. The 2 floor terrace will be paved with pieces of Ipe wood with drainage open joint, on slope formation mortar. Floor 6 and balconies will last non-slip prefabricated concrete parts. In walls and partitions will be used paint and in installation rooms, plasterwork. In the exterior, it will be used continuous monolayer paint, plated with wooden planks of ipe and plasterboard with water-resistant plaster. In bedrooms 2.5mm linoleum liner will be used and in bathrooms and kitchen will be 2.5mm PVC on wall. Figure 7 shows a render of the building.

Figure 7. Render of the building [2].

2.2.6. Needs program

Equipment planned to become home to people affected by cerebral palsy in limited support and with some places of external support. Residents are expected to leave in the morning to an occupational center, special work center, workplace or educational center to carry out activities until 18:00 p.m.

Optional services are also planned to fill the afternoon and weekend hours, but open to the neighbourhood and the city to ensure a greater social inclusion of the inhabitants.

- Treatment gym: Located in the basement for physiotherapy treatments.
- Computer classes.

Likewise there will be services open to other possible users of the neighbourhood, as well as available spaces for treatments and meetings. Individual inquiries: They will be used for services of speech therapy, psychotherapy, general medicine, neurology, nursing and other individualized care. Meeting and training rooms: They will serve for the training of remunerated staff, volunteers and other similar utilities.

2.2.7. Name of places of each one of the types of services

HOME RESIDENCE

- 24 seats = 12 limited support + 12 full support.

INFORMATIC ROOM

- 10 hours of service per day.
- 7 Days / week. From Monday to Sunday.
- 15 computer equipment. 2 hours average / user.
- 54 users a week.

TREATMENT GYM

- 10 hours of service per day.
- 6 days / week. From Monday to Saturday.
- 5 people / hour = 300 people per week.

INDIVIDUAL CONSULTATIONS

- 10 hours of service per day.
- 5 days / week. From Monday to Friday.
- 1 person / hour = 50 people per week.

MEETING AND TRAINING ROOMS

- 10 hours of service per day.
- 6 days / week. From Monday to Saturday.
- 10 people / hour = 600 people per week.

ADMINISTRATION AND MANAGEMENT

- 10 hours of attention to the public.
- 6 days / week. From Monday to Saturday.
- 500 users attended each year.

2.2.8. Types of services

HOME RESIDENCE: Home residence with half board on weekdays and full board at weekends and holidays.

Expected services:

- Overnight stays.
- Shower and breakfast.
- Guard service due to possible casualties or illnesses of the inhabitants.
- Welcome after working hours.
- Dinner and dressing
- Global assistance (24h) on weekends and holidays.

INFORMATIC ROOM: Access to the information and communication technologies for the inhabitants and open to the neighborhood and the city.

Expected services:

- 15 Computer equipment + Printer + ADSL + Scanner + FAX.

- Computer support monitor

TREATMENT GYM: Rehabilitation gym prepared for people affected by cerebral palsy and related disabilities for continued rehabilitation.

Expected services:

- Physiotherapy service arranged with Social Security.
- Physiotherapists specialized for the inhabitants of the home. Mainly for those who do not attend each day at a center where the rehabilitation service has not been arranged.
- Agreement of the service with other institutions: Sant Joan de Deu, Guttmann, etc.

INDIVIDUAL CONSULTATIONS: Services of speech therapy, psychotherapy, general medicine, neurology, nursing and other individualized services in rooms of small dimensions.

Expected services:

- Services for the inhabitants of the home.
- Assignment of space to other institutions: Sant Joan de Deu, Guttmann, etc.

MEETING ROOMS AND TRAINING: Half-size rooms for training and meeting of remunerated staff, volunteers and other similar utilities.

Expected services:

- Training of the remunerated personnel of direct attention to the inhabitants of the home.
- Formation of volunteers with direct attention to the inhabitants of the home.
- Coordination meetings of the various home-based services.

MANAGEMENT AND ADMINISTRATION: Infrastructure offices of all complementary services: daily sport and competitions, support programs for women and families, International Exchanges, dissemination and standardization programs for life, etc.

2.2.9. Characteristic use of the building

An assisted residential housing model is proposed that covers your personal assistance needs but at the same time with a strong respect for the privacy and personal freedoms of residents. It is a model of a residential center open to the environment that allows the exercise of personal autonomy and facilitate social life.

Additionally, the program offers optional services that are useful to residents of the home as well as other people affected by cerebral palsy and their families.

In the plans ARQ-03 it is possible to see the different activities and utilities that each of the rooms of the building have.

The next figure 8 shows a render of the building in the part of the courtyard.

Figure 8. Render of the building [2].

3. CONSTRUCTIVE MEMORY

This section talks about the installations that are necessary to build to satisfy the required necessities.

3.1. SANITATION

This section applies to the installation of sewage and rainwater drains and it is necessary to install pipes to take this water out. The procedure to install the sewage sanitation of the building is to find the points where you have drain water and then install the conducts with the correct diameter. It is also necessary to install pumps to have the power to take this water out of the building.

For the rainwater it is necessary to install different pipes in the roof.

3.1.1. Introduction

There will be hydraulic closures in the installation that prevent the passage of the air contained in it to the occupied premises without affecting the flow of waste.

The pipes of the evacuation network will have the simplest route possible, with distances and slopes that facilitate the evacuation of the waste and be self-cleaning. The water retention will be avoided in its interior. The diameters of the pipes will be suitable for carrying the foreseeable cabins in safe conditions. The piping networks will be designed in such a way that they are accessible for maintenance and repair, for which they must be available in sight or housed in empty.

Otherwise they will have boxes or registers. There will be adequate ventilation systems that allow the operation of hydraulic closures and the evacuation of mephitic gases. The installation will not be used for the evacuation of other types of waste other than sewage or rainwater.

3.1.2. Standards regulation

The criteria to be followed for the design of the sewage and rainwater network will be those indicated in the technical specifications of the HS Basic Document of Sanitation, of the Technical Code of the CTE Building, in its Section HS 5 Water evacuation [3].

3.1.3. Installation properties

Hydraulic closures:

The hydraulic closures will have the following characteristics:

- They will be autocleaned, in such a way that the water that crosses them drags the solids in suspension.
- Their interior surfaces will not retain solid materials.
- They will not have moving parts that prevent their proper operation
- They will have a cleaning registry easily accessible and manipulable.
- The minimum height of hydraulic closure must be 50 mm, for continuous uses and 70 mm for discontinuous uses.

  The maximum height must be 100 mm. The crown should be at a distance equal to or less than 60 cm below the drain valve of the device. The diameter of the trap must be equal to or greater than the diameter of the drain valve and equal or less than that of the drain branch.

  In case there is a difference in diameters, the size should increase in the direction of the flow.
- It will be installed as close as possible to the drain valve of the device, to limit the length of the raw tube without protection to the environment.
- If there is a single hydraulic closure for the service of several devices, the distance from these to the closure will be reduced to the maximum.
- The siphon boats will not provide sanitary equipment not disposed in the humid room where it is installed.
- The drainage of sinks, laundry and pumping equipment (washing machines and dishwashers) will be made with individual siphons.

Ventilation:

Ventilation subsystems will be available both in sewage and rainwater networks.

3.1.4. Description and sizing of the wastewater network

To sizing the network is necessary to know the installed points of the building. Thanks to the plans RES-01 it is possible to find the place of the all the drain points. In the

Table 1 it has been shown the different points where there is waste of water for each floor.

Floors	Hand washer [units]	Shower [units]	Toilet [units]	Sink [units]	Dump [units]	Washing machine [units]	Kitchen sink [units]
-1	4	3	4	1			
0	1		1	1			
1	2		2		1		4
2	2	2	2	3	1		1
3	8	2	2	3	1		1
4	8	2	2	3	1	3	1
5	8	2	2	3	1	3	1
6				3	1	3	
TOTAL	33	11	15	17	6	9	8

Table 1. Wastewater points

The Table 2 shows the different drain points of every installation.

	Units of drain	nº units	TOTAL
Hand washer	1	33	33
Shower	2	11	22
Toilet	4	15	60
Sink	1	17	17
Dump	8	6	48
Washing machine	3	9	27
Kitchen sink	3	8	24
TOTAL			231

Table 2. Drain points

To determine the diameters of the collector branches between sanitary devices and downpipes, Table 4.3 of Document HS 5 [3] has been observed, showing the dependent diameter of the collector slopes and the maximum number of DU (Drain Units). This table 3 shows the Table defines in the document commented above.

Maximum number of drain units			Diameter (mm)
Collector's slope			
1%	2%	4%	
-	1	1	32
-	2	3	40
-	6	8	50
-	11	14	63
-	21	28	75
47	60	75	90
123	151	181	110
180	234	280	125
438	582	800	160
870	1.150	1.680	200

Table 3. Diameter in function of the drain points

On the other hand, the diameter of the horizontal collectors is obtained from table 4.5 of the same Basic Document [3]. The minimum slope to be used in the project for buried collectors will be 2% and for suspended networks, 1%

To drainage and pumping wastewater is necessary to install bilge pumps. In this project it has been installed 4 pumps with a power of 1.5 kW each one that it is enough to drain all the water to the exterior [2].

The figure 9 shows a photo of a bilge pump.

Figure 9. Bilge pump [4].

3.2. PLUMBING/WATER SUPPLY

Plumbing installation consists on give water to the points of the building that need it like the toilet or the shower. The procedure to install it is to know how many points do you have in the building and then to calculate how much water do you need depending on the object. The aim is to install pumps and pipes with the needed diameter that can supply the water in the hall building.

3.2.1. Standards regulation

- CTE, March 2006. Basic Document HS-4 (Water Supply) [5].
- CTE-DB HE-4 Technical Building Code. Basic Document HE (Energy saving, minimum solar contribution of domestic hot water) [6].
- Decree 21/2006, of 14 February, which regulates the adoption of environmental criteria and Eco-efficiency in buildings [7].

3.2.2. Design conditions

The object is to guarantee the water supply in all the building contemplated in the project. To begin with, the consumption points of the buildings and their instantaneous flows have been established.

In order to calculate the minimum instantaneous consumption, Table 2.1 of the CTE-DB HS-4 (Water Supply) [5] will be used, taking into account the minimum and maximum flows required by Decree 21/2006, which are 0.15 l / s. 0.20 l / s [7]. The general supply will be made by the supply company, being strict compliance with the particular rules of the same. The installation will connect to the existing municipal network, which guarantees a minimum supply pressure of 3,5 - 4,5 Kg/cm², if there is the possibility of input pressures greater than 9 Kg/cm², a pressure regulating valve will be installed.

Plans IFA-01 show the canalization of the different water points in every floor.

The installation has to supply the appliances and hygienic equipments with the flows that appear in the following table 4 and 5.

Minimum instantaneous flow for every equipment		
Type of equipment	**Instantaneous minimum flow of cold water [l/s]**	**Instantaneous minimum flow of DHW [l/s]**
Sink	0,1	0,065
Shower	0,2	0,1
Toilet with cistern	0,1	-
Toilet with fluxor	1,25	-
Urinal with timed tap	0,15	-
Urinal with cistern	0,04	-
Sink of kitchen	0,3	0,2
Dishwasher	0,25	0,2
Washing machine	0,6	0,4
Laundry	0,2	0,1
Isolated faucet	0,15	0,1

Table 4. Minimum instantaneous flow for every equipment

The calculations for the DHW prevision are done it from the following considerations.

Demand to reference 60ºC		
Critery of demand	**Liters DHW/day at 60ºC**	
Hospitals/Clinics/Residences	55	for bed
Changing room	15	for service
Laundry room	3 to 5	for 1 kg of clothes
Kitchen/dining room	5 to 10	for meal

Table 5. Demand of liters DHW

The first step is to size the flow of the different units of the building for cold and hot water.

3.2.3. Simultaneous coefficient and velocity of calculation

Once the necessary minimum fictitious flow rate has been obtained, taking into account that all the supplies are working at the same time, the second step will be to calculate the actual flow rate that will flow through each of the sections of the installation according to the number of devices it feeds. In order to calculate the actual flow (both cold and hot water) that will circulate through each of the sections, the fictitious flow will be multiplied by a simultaneity coefficient.

$$Q_{real} = Q_{fictitious} * \frac{1}{\sqrt{n-1}} \quad (1)$$

n = Number of supplies

The calculated speed of water that will circulate inside the pipes, according to the recommendations of the CTE:

- Metallic pipes: 0.50 - 2.00 m/s
- Thermoplastic pipes: 0.50 - 3.50 m/s

The design speed of the water that will circulate throughout the installation will be between 0.5 m/s and 1.5 m/s.

3.2.4. Calculation of the diameter

The calculation of the diameter will be made according to the indications of the following formula.

$$Q = V * A \quad (2)$$

Where:

Q = Flow (m3/s)

V = speed (0.50-1.50) m/s

A = section of the pipe.

Where the area (pipe section) of a circumference is obtained as follows:

$$A = \pi * \frac{D^2}{4} \quad (3)$$

Once the diameter of each section of the installation has been calculated, this diameter will be compared with the minimum diameters required in Table 4.3 of the CTE-DB HS-4 [5].

The table 6 shows the minimum diameters.

Sections considered	Nominal diameter of the feeding tube	
	Steel (“)	Copper or plastic (mm)
Feeding to private wet sites: bathrooms, toilets, kitchens.	3/4	20
Feeding to particular derivation: Housing, apartment, commercial premises..	3/4	20
Column (stile or descendant)	3/4	20
Main distributor	1	25
< 50 kW	1/2	12
50-250 kW	3/4	20
Air conditioning equipment	1	25
250-500 kW	1	25
> 500 kW	1 1/4	32
DHW recirculation	3/4	16

Table 6. Nominal diameter of the feeding tube

Following the steps mentioned before the result of the flow and the diameter of the installation is expressed in the tables below. The first one has the equipment related with DHW and the second one with cold water.

Floor	Hand washer	Q(l/s)	Kitchen sink	Q(l/s)	Shower	Q(l/s)	WC	Q(l/s)	Dump	Q(l/s)	n	Qsum(l/s)	Kp	Qt(l/s)
-1	3	0,065	0	0,1	4	0,1	3	0,065	0	0,2	10	0,79	0,33	0,26
0	1	0,065	0	0,1	1	0,1	1	0,065	0	0,2	3	0,23	0,71	0,16
1	1	0,065	0	0,1	0	0,1	1	0,065	0	0,2	2	0,13	1,00	0,13
2	3	0,065	3	0,1	0	0,1	2	0,065	0	0,2	8	0,625	0,38	0,24
3	8	0,065	0	0,1	2	0,1	2	0,065	1	0,2	13	0,85	0,29	0,25
4	8	0,065	0	0,1	2	0,1	2	0,065	1	0,2	13	0,85	0,29	0,25
5	8	0,065	0	0,1	2	0,1	2	0,065	1	0,2	13	0,85	0,29	0,25
TOTAL	32		3		11		13		3		62		**0,13**	**1,53**

Qt(l/s)	Kn	Qm(l/s)	Dnorm ext
1,53	0,50	**0,76**	**50**

Floor	Hand washer	Q(l/s)	office/p.water	Q(l/s)	Kitchen sink	Q(l/s)	Shower	Q(l/s)	WC	Q(l/s)	Dump	Q(l/s)	n	Qsum(l/s)	Kp	Qt(l/s)
-1	3	0,1	0	0,2	0	0,2	4	0,2	3	0,1	0	0,3	10	1,4	0,33	0,47
0	1	0,1	0	0,2	0	0,2	0	0,2	1	0,1	0	0,3	2	0,2	1,00	0,20
1	2	0,1	0	0,2	0	0,2	0	0,2	2	0,1	0	0,3	4	0,4	0,58	0,23
2	2	0,1	0	0,2	3	0,2	1	0,2	2	0,1	0	0,3	8	1,2	0,38	0,45
3	8	0,1	0	0,2	0	0,2	2	0,2	2	0,1	1	0,3	13	1,4	0,29	0,40
4	8	0,1	0	0,2	0	0,2	2	0,2	2	0,1	1	0,3	13	1,4	0,29	0,40
5	8	0,1	0	0,2	0	0,2	2	0,2	2	0,1	1	0,3	13	1,4	0,29	0,40
6	0	0,1	4	0,6	0	0,2	0	0,2	0	0,1	0	0,3	4	2,4	0,58	1,39
TOTAL	32		4		3		11		14		3		**67**		**0,12**	**3,95**

Qt(l/s)	Kn	Qm(l/s)	D(mm)c	Dnorm ext
3,95	0,60	**2,37**	55	**63**

Table 7. Nominal diameter of the feeding tube

3.2.5. Installation of DHW and cold water

According to a document issued by Agbar [8], where it is indicated that under normal conditions of supply the pressure on the street will be at least 40 m.w.c and according to estimates of preliminary calculation for the supply of the building will be able to connect directly to the network.

All distribution of the water points will be carried out in accordance with the distribution scheme of the pipe that is accompanied, and the feeding will be carried out at the center's core.

The distribution will be carried out by means of pipes of polypropylene for food use, PN 10 for cold water and PN20 for hot salt water, with the corresponding insulations with elastomeric shell, in compliance with the legislation of Legionella. Likewise, the installation of DHW will be provided with return pipe.

General cutting valves will be placed in the main uprights, at the entrance of each humid location, as indicated in the plants.

All the tubes will be insulated with thick elastomeric shell according to the RITE specification [9] or with a corrugated tube in the final sections of the connection.

The DHW network will be totally watertight, as we have said, isolated, with a correct flow of water, preventing it from stagnating, so the return tube will be installed.

The internal network will have a system of anti-theft valves that prevents water returns due to loss of pressure or reduction of flow supply.

The cold water pipes will move away from the hot water so that there is no transfer of heat from each other. It must be avoided that the cold water does not exceed 20ºC [10] .

The temperature of the hot water circuit must not be less than 50º at the furthest point of the circuit or at the return pipe in the accumulator. The installation allows the water to reach a temperature of 70º C to fight the Legionella.

The DHW tank is located in an accessible place in the warehouse 2, for inspection and cleaning, disinfection and sampling. It will have a man's mouth that allows access to the interior. Materials in contact with water will be able to withstand the action of temperature and disinfectants. A maintenance, cleaning and disinfection program will be performed.

The elements such as diffusers, faucets or others where water stagnation can occur and are susceptible to producing aerosols will be cleaned and disinfected periodically.

The supports of DHW supply pipes will be made according to the UNE 100-152 / 1988 standard [11]. For the commissioning of the system, it will be considered to perform the sealing test according to UNE 100-151 / 1988 [12].

DHW accumulation system

The proposed system consists of one 1000 liter DHW accumulator connected to the secondary circuit of pipes that recirculate the water through circulating pumps.

The accumulator will be galvanized by immersion hot, interior and exterior, for a work forecast of 8 kg/cm^2, incorporating a man's mouth for registration and cleaning, flanges for entry and exit of water, faucet, automatic air purger and drain valve.

The deposits will be designed to allow the necessary treatments against the "Legionellosis". The pumps will be mounted with cutting valves and check valves in their outputs.

Control system

For the automatic operation of the installation, a regulation system must be provided that allows starting the primary and secondary pumps.

The regulation of the system is achieved thanks to a regulating switchboard which, based on the information provided by a series of probes, acts conveniently on the different pumps, to optimize the operation of the installation.

The regulating switchboard compares the temperature of the collectors with the temperature of the accumulation.

When the thermal leakage is favourable, the pump of the primary circuit is put into circulation. There is a 3rd probe placed at the entrance of the primary circuit plate exchanger, which detects when the temperature of the primary circuit is optimal for transferring the energy to the accumulator. At this time the secondary circuit pump is started. When the temperature differences cease to be favourable, the corresponding pumps stop (always keeping a suitable hysteresis).

Exchanger:

It is the element that separates hydraulically the primary circuit from the municipal network of heat transfer, of the secondary circuit (loaded with water from the consumption network).

Insulation of pipes

The pipes of the hot and return water circuits will be isolated to avoid heat loss. The vacuum pipes, spillages and safety valve outlets will not be isolated inside the technical centers.

Discharge pipes to sanitary equipment will also be none isolated, but they will be protected by a corrugated tube to facilitate their free expansion and avoid contact between the work material and the pipes.

The chosen isolation is based on a synthetic insulating thermal conductivity jacket less than 0.035 W/m^2 of 19 mm thick, with insulated accessories based on the same material.

In the interior of the machine rooms of the pipes, they will be colour painted standardized according to the DIN standard [13].

Once the installation of the pipes has finished, they will be signposted with standard coloured adhesive tape, according to DIN standards [13], in sections of 2 to 3 meters of separation and always coinciding in the registration points, touching with valves or Standards regulation elements.

The figure 10 shows a scheme of the installation of domestic hot water installation.

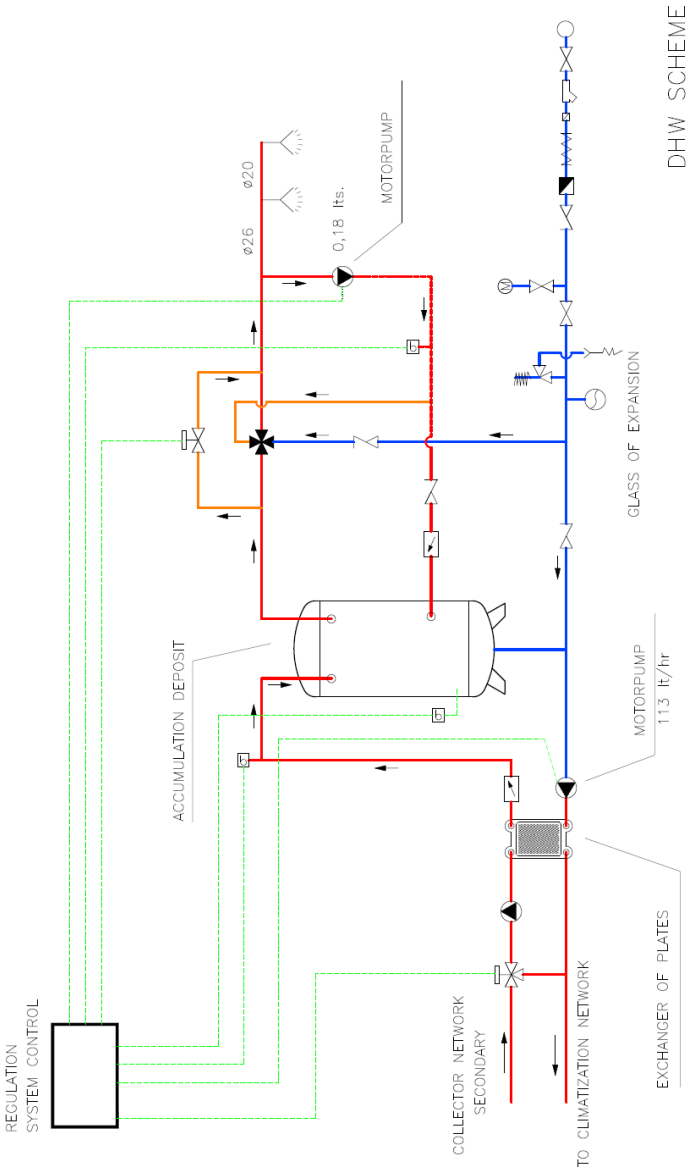

Figure 10. Scheme of domestic hot water installation.

3.2.6. Circulation pumps

In the DHW installations, pumps are used in the primary circuit to transfer heat from the boiler circuit to the consumption water circuit. Secondary pumps are necessary when the production is done by accumulation with external exchangers, and recirculation pumps for the circulation of water throughout the building.

The primary circuit is a closed circuit in which the water has very little aggressiveness, since after the first purges the dissolved oxygen is eliminated and it is usually a circuit that only receives new water in the repairs or replenishments of leaks [14].

However, the secondary and recirculation circuits are open circuits, in which drinking water is continuously being received and is much more aggressive with the constituent materials of the installations; in addition the materials in contact with that water should not modify their potability.

These aspects will be taken into account in the moment to select the equipment, all pump manufacturers in their catalogs specify the appropriate ones for these services, the most suitable being those made of bronze or stainless steel. For the flow rates required in these installations, the most common pumps are wet rotor; although considering that at high temperatures calcareous precipitations are accelerated, smaller and smaller dry rotor pumps are being applied.

To select the satisfaction pumps it is necessary to know the flow to move and the loss of charge due to the conducts. Taking account the requirements of the building and according to previous projects, it has been selected the following pumps for every necessity. The table 8 shows every pump with his respective power.

Circulation pumps	Model	Number units	Power (W) x unit	Total power (W)
Primary DHW	SAP 25/125-0.25/K	2	250	500
Secundary DHW	SAP 25/105-0.25/B	2	250	500
Recirculation DHW	SAP 25/105-0.25/B	2	250	500
TOTAL		6	750	1500

Table 8. Selected circulation pumps

Figure 11. Circulation pump [15].

3.3. CLIMATIZATION AND VENTILATION

This section consists on the installation of air-conditioning of the building and his ventilation. To install that kind of installations it is important to know the characteristics that every room have according to the use of it and the external characteristics. With that, you can calculate the thermal loads of each one in the cimatization and refrigeration way. To satisfy this, you have to install an air-conditioning system and install the adequate pipes.

3.3.1. Standards regulation

• REAL DECREE 314/2006, of March 17, which approves the Technical Building Code, C.T.E, Basic Document, HS Salubrity, HS3 Indoor Air Quality.

• REAL DECREE 207/2007, of August 29, which approves the Standards regulation of Thermal Installations in Buildings and its Complementary Technical Instructions and creates the Advisory Commission for Thermal Installations of Buildings.

• ROYAL DECREE 3089/1982, of October 15 that establishes the subjection to technical norms of the types of radiators and convectors by means of fluids and its homologation by the Ministry of Industry and Energy BOE of 11-22-82.

• ORDER of March 28, 1985 for which various articles are modified the Complementary Technical Instruction MIE-AP1 of the Pressure Equipment Standards regulation, referring to boilers, economizers, preheater, superheater and reheater. BOE of 04-13-85.

• ORDER of May 31, 1985, which approves the Complementary Technical Instruction MIE-AP11 of the Standards regulation of Pressure Appliances, referring to appliances intended to heat or accumulate hot water manufactured in series BOE 184 of 21-06-85.

• ORDER of May 31, 1985, which approves the Complementary Technical Instruction MIE-AP12 of the Standards regulation of Pressure Appliances referring to hot water boilers. BOE of 06-20-85.

• REAL DECREE 1975/1998, of July 31, which approves the Standards regulation of Thermal Installations in Buildings and its Complementary Technical Instructions and creates the Advisory Commission for Thermal Installations of Buildings. BOE of 05-08-98 and BOE of 10-29-98.

• ORDER of June 21, 2000 by which the Schedule of the Order of February 10, 1983. is modified. BOE 154 of 06. 28-00.

• Royal Decree 238/2013 of April 5, by which certain articles and technical instructions of the THERMAL INSTALLATIONS STANDARDS REGULATIONS IN BUILDINGS (RITE) are modified. Royal Decree 1027/2007 of July 20.

3.3.2. Quality of interior air

The building will have the tools so that its enclosures can be ventilated properly, eliminating contaminants that occur daily during the normal use of the building, so that a sufficient flow of outside air will be provided and will be guaranteed the extraction and expulsion of air contaminated by pollutants.

The ventilation is carried out with the considerations of the UNE with recent incorporation in the RITE, EN 13779: 2004 about "Ventilation of non-residential buildings. Requirements for the provision of ventilation and conditioning systems of the places. " [16]. Because of that, the following table 9 will be taken into account, which shows the different categories of the indoor air quality (IAQ) that can be possible in rooms:

Cathegory	Units	Outdoor air rate per person	
		Non-smoking area	
		Typical interval	Default value
IAQ 1	m3/h·pers	>54	72
	l/s·pers	>15	20
IAQ 2	m3/h·pers	36-54	45
	l/s·pers	10-15	12,5
IAQ 3	m3/h·pers	22-36	29
	l/s·pers	6-10	8
IAQ 4	m3/h·pers	<22	18
	l/s·pers	<6	5

Cathegory	Description
IAQ 1	High indoor air quality
IAQ 2	Medium indoor air quality
IAQ 3	Moderate indoor air quality
IAQ 4	Low indoor air quality

Table 9. Outdoor air rate

It is considered that the building is a smoke-free space. The human occupation will also be determined to determine the ventilation rate by applying the following table 10:

Type of use	Floor area per person in m2/pers	
	Typical	Default value
Panoramic offices	7 to 20	12
Small offices	8 to 12	10
Meeting room	2 to 5	3
Shopping center	3 to 8	4
Classroom	2 to 5	2,5
Hospital room	5 to 15	10
Hotel room	5 to 20	10
Restaurant	1.2 to 5	1,5

Table 10. Floor area per person for every room

For extraction, the following table 11 is considered:

Design values for the extracted air flow rates			
Type of use	Units	Typical interval	Default value
Kitchen			
Simple use	m3/h	>72	108
	l/s	>20	30
Bathroom			
Per enclosure (minimum)	m3/h	>24	36
	l/s	>6.7	10
Per floor area	m3/h·m2	>5	7,2
	l/s·m2	>1.4	2

Table 11. Design values for the extracted air flow rates

3.3.3. Ventilation of the places

The locals corresponding to toilets and changing rooms must be ventilated by means of air extraction. The flow to extract is determined by section IT 1.1.4.2.5 of the Standards regulation of Thermal Installations in Buildings [17]. In the case of toilets and changing rooms they are considered as locals with a high level of contamination, being classified as category AE3, so the flow to be extracted must be at least 7.2m3/h per m^2 of surface and the extracted air cannot be recirculated, and must be expelled directly and individually to the outside.

The following table 12 describes the impulsion and the extraction of the air in every room, depending on the category that has been classified.

		IMPULSION OF EXTERIOR AIR					EXTRACTION					
Floor	Use	m2	nºP	Cathegory	m3/h-p	AIIM	m2	PERS	Cathegory	m3/h-p/m2	AEXT	
						m3/h						m3/h
P5	Bedrooms		8	IDA 2	45	360			ETA1		288	
	Dinning room		8	IDA 2	45	360			ETA1		288	
	Bathroom	5					5		ETA3	7.2		36
P4	Bedrooms		8	IDA 2	45	360			ETA1		288	
	Dinning room		8	IDA 2	45	360			ETA1		288	
	Bathroom	5					5		ETA3	7.2		36
P3	Bedrooms		8	IDA 2	45	360			ETA1		288	
	Dinning room		8	IDA 2	45	360			ETA1		288	
	Bathroom	5					5		ETA3	7.2		36
P2	Dinning room		24	IDA 2	45	1080			ETA1		864	
	office net	5		IDA 2	3	14.94	5		ETA2	7.2		36
	Warehouse	8		IDA 2	3	23.904	5		ETA2	7.2		36
	Changing room		1	IDA 3	28.8	28.8			ETA2		34.56	
	Bathroom	5					5		ETA3	7.2		36
	Kitchen	120										
P1	Office		1	IDA 2	45	45		1	ETA1		36	
	Room		4	IDA 2	45	180		4	ETA1		144	
	Meeting room		8	IDA 2	45	360		8	ETA1		288	
	File	5		IDA 2	3	14.94	5		ETA2	7.2		36
	Bathroom	5					5		ETA3	7.2		36
PL	Vestibule		8	IDA 2	45	360			ETA1		288	
	Entrance		12	IDA 2	45	540			ETA1		432	
	Bathroom	5					5		ETA3	7.2		36
	Multipurpose room		0	IDA 2	45	0			ETA1		0	
	Warehouse	8		IDA 2	3	23.904	5		ETA2	7.2		36
P-1	Fitness center		10	IDA 3	28.8	288			ETA3			345.6
	Changing room		2	IDA 3	28.8	57.6			AE2	28.8		69.12
	Bathroom	5					5		ETA3	7.2		36
	Warehouse	8		IDA 2	3	23.904	5		AE2	7.2		36
	Installation rooms	5		IDA 2	3	14.94	5		ETA2	7.2		36

Table 12. Impulsion and extraction air in every room

For the extraction of the locals ETA1 (Extracted Air) and ETA2 is provided a return conduit of the same material than the impulsion conduct, towards the recovery equipment. For other locals ETA3 and ETA 4 an independent extraction system has been planned, forced removal is carried out.

Kitchen

The kitchen has an additional specific system of ventilation with mechanical extraction for vapours and contaminants of cooking. For this, an extractor connected to an extraction duct independent of those of the general ventilation of the building must be available that cannot be used for the extraction of air from premises of other use.

When this conduit is shared by several extractors, each of these must be equipped with an automatic valve that maintains its connection to the duct only when it is operating or any other anti-theft system. The smoke extraction will be installed for a hollow mural wall mounted in AISI-304 stainless steel. It will be a 1mm thick sheet with grease collector in the back with emptying screws.

It will be installed interior windows regulating the flow of air and 3 filters of stainless lick. It will be a ventilation box 400º / 2h 12/12 2CV to guarantee a flow of 3,000 m3/h. System of contribution of air for plenum per box of 12/12-1CV. The dimensions are 3750x800x650 mm. This bell will conduct the smoke outwards by means of a circular duct of 400mm diameter. The sectorization will be completed for 120 minutes.

In plans ARQ-04 it is possible to see the distribution of the different machines in the kitchen on 5 views.

3.3.1. Air conduction

The air conduction is done with rectangular duct of galvanized steel sheet, isolated according to RITE [9]. Firewall gates will be placed on all sector changes.

The calculations of the dimensions have been performed by the constant friction procedure, so that the maximum speeds do not exceed 6 m/s. Respect to the diffusion, the residual velocity does not exceed 0.24 m/s at 1.8 m in height. The figure 12 shows the structure of a rectangular duct of galvanized steel sheet.

Figure 12. Rectangular duct of galvanized steel sheet [18].

3.3.2. Air distribution

The distribution of air is made with drive and return grids located according to plans. The elements of air distribution are designed to meet the following conditions:

- Resistance to corrosion. That is why it has been defined that they are constructed of aluminium.
- Noise level reduced. The dimensions have been calculated so that the airway speed is maintained within the limits specified by the manufacturer.
- Ability to control the flow and direction of the air vein, thus allowing the best control of the movement of the air, and therefore, the comfort.

In the definition of all the characteristics of grates and diffusers the instructions of the manufacturer have been considered.

3.3.3. Calculation of the exterior conditions

Dry temperature in summer: 29.3 ° C. Humid temperature in summer: 23.3 ° C. Percentage conditions in summer: 1.0%. Dry temperature in winter: 0.1 ° C. Percentage conditions in winter: 99.0%. Day variation of temperatures: 8.4 ° C. Accumulative grades on base 15 - 15 ° C 863 days-grade. Orientation of the dominant wind: N. Velocity of the dominant wind: 3.6 m / s. Height above the sea level: 8 m. Latitude: 41 ° 18 'North.

3.3.4. Calculation of the interior conditions

The designs of the interior conditions are fixed in function of the metabolic activity of the people and the degree of dress and, in general, in function of the indications of the specific norm RITE and UNE correspondent [9]. In general, the design temperature in summer will be set at 25ºC and 55 of humidity. In winter it is generally set at 21ºC. The

specific spaces will have special treatment. For the calculation of the thermal loads of the different locals and places of the project, it has been used an excel table, with the departure data indicated above [19]. The thermal needs of the building are:

- Cold power (Refrigeration): 105 kW
- Hot power (Heating): 90 kW

Thanks to those calculations of Thermal Loads it is possible to design the heating and cooling system in summer and in winter, taking account the hot and cold generation of the fluid.

Then, the table 13 shows the summary of the different thermal needs in every place and the fan coil selected in every room.

DEPENDENCE	COLD LOAD(kW)	HOT LOAD (kW)
FLOOR -1		
Fitness center	7,41	2,40
Changing room 1	0,00	5,63
Changing room 2	0,00	5,63
TOTAL	**7,41**	**13,66**
FLOOR 0		
Entrance	7,01	5,57
Multipurpose room	4,19	3,59
Vestibule	12,05	9,15
TOTAL	**23,25**	**18,31**
FLOOR 1		
Office	1,62	0,82
File	1,44	0,70
Meeting room	5,54	4,80
Room	4,14	2,58
TOTAL	**12,74**	**8,90**
FLOOR 2		
Dinning room	16,11	14,38
Bathroom 1	0,00	0,68
TOTAL	**16,11**	**15,06**
FLOOR 3		
Individual bedroom 1	1,20	0,82
Individual bedroom 2	1,20	0,82
Individual bedroom 3	1,20	0,82
Individual bedroom 4	1,20	0,82
Double bedroom 1	1,73	1,43
Double bedroom 2	1,73	1,43
Dinning room	5,20	4,72
TOTAL	**13,46**	**10,86**
FLOOR 4		
Individual bedroom 1	1,20	0,82
Individual bedroom 2	1,20	0,82
Individual bedroom 3	1,20	0,82
Individual bedroom 4	1,20	0,82
Double bedroom 1	1,73	1,43
Double bedroom 2	1,73	1,43
Dinning room	5,20	4,72
TOTAL	**13,46**	**10,86**
FLOOR 5		
Individual bedroom 1	1,65	1,04
Individual bedroom 2	1,65	1,04
Individual bedroom 3	1,65	1,04
Individual bedroom 4	1,65	1,04
Double bedroom 1	2,32	1,79
Double bedroom 2	2,32	1,79
Dinning room	6,23	5,37
TOTAL	**17,47**	**13,11**
TOTAL	**103,90**	**90,76**

Table 13. Summary of the different thermal need in every place

3.3.5. Energy production

It has designed a heating and cooling system based on refrigerant variable flow rates (VRF). This system is capable of giving heat or cold depending on the needs of the users.

Like ductless minisplits VRFs use refrigerant as the cooling and heating medium. This refrigerant is conditioned by a single outdoor condensing unit, and is circulated within the building to multiple fan-coil units.

Each of the rooms and dependencies has been heated independently, with a system of Heat Pump Conduct units, which means that all of them will have cooling and heating for air, according to the needs every the time of year.

The external units were placed on the roof of the building, as close as possible to their respective internal units, so that the cold distances are reduced to the maximum. The external units will be supported on antivibrators to avoid the transmission of vibrations to the structure of the building.

According to the needs of the building, it is proposed the installation of the exterior unit DAIKIN RXYQ40T. The figure 13 shows the characteristics of this machine.

The other places will be heated and cooled with interior units according with the loads calculated before. The plans below show the distribution of the fan coils in every floor. In plans ICL-01 there are drawn the situation of the fan coils and their canalization.

Figure 13. DAIKIN RXYQ40T [20].

3.4. ELECTRICAL INSTALLATION

The electrical part of the building cover the lighting installation, the shuko sockets and internet connectors installation as it is shown in the plans below.

It is defined the supply options the building will support and it is calculated the electrical power that will waste in every installation.

It is calculated the different distribution of the low voltage distribution panels in order to supply all the necessary energy in all the parts of the building.

The first step is to calculate the power of every object and then distribute the lines. After that, sum all the power to contract this energy.

3.4.1. Standards regulation

For the elaboration in detail of this installation, the following documentation will be taken into account:

- E.R.L.V Electrotechnical Standards regulation for Low Voltage (Decree 842/2002 of August 2, 2002), Complementary Technical Instructions and Provisions for subsequent application.
- Electrical Verification Standards regulation
- UNE Standards
- CEI Standards
- Recommendations UNESA / NTE

Particular Rules of Liaison for the supply of Electric Power

- CTE-2006
- Municipal By-Laws
- Environmental Recommendations

3.4.2. Electricity supply

The building will have two different supply systems, which are:

- Photovoltaic panels

210 photovoltaic panels will be installed on the roof, which will cover a power of 52.5 kW which would be a 31 % of the total power of the building.

- Network supply:

It is performed through a company transformation center. The necessary space was planned to house this center on the PS-1 of the building. The expected maximum power will be 199 KW, and the power to contract of 169 KW. This contract will be carried out in the low voltage mode.

- Emergency supply:

It is made through an electrogen group. The expected power is 42.25 kW, so the autonomous group of 68kVA has been dimensioned, 25% of the expected power contracted. The internal distribution of this power is carried out from a G.L.V.D.P (General Low Voltage Distribution panel) located in the Basement, powered by a network supply and a commutated emergency.

3.4.3. Electrical power

The electrical power of the building has been estimated based on the electrification needs of the areas of each building. Below is the installed power in each part of the building together with the justification for the distribution of said power. The table 14 shows the different electrical power supplied to every installation.

LINE	Installed power [kW]
Lighting	1,70
Climatization and ventilation	33,31
Schuko sockets / internet connectors	94,00
Elevators	15,00
Fire protection	13,70
Megaphony	0,75
Plumbing	1,50
Sanitation	6,00
Kitchen	18,57
Others	14,20
TOTAL	198,73

LINE		Installed power	Coef.	Power of calculation
		[kW]	Simultaneity	[kW]
LVGC	CGF - N	19,13	0,85	16,26
LVGC	CF1 - N	7,63	0,85	6,48
LVGC	CF2 - N	5,78	0,85	4,91
LVGC	CKI - N	20,15	0,75	15,11
LVGC	CF3 - N	11,94	0,85	10,15
LVGC	CF4 - N	13,31	0,85	11,31
LVGC	CF5 - N	11,94	0,85	10,15
LVGC	CF6 - N	19,19	0,85	16,31
ELECTROGEN GROUP		44,61	1,00	44,61
LVGC	CUF - P	1,27	1,00	1,27
LVGC	CUPS	10,00	1,00	10,00
LVGC	FPC - P	13,20	1,00	13,20
LVGC	CF3 - P	0,33	1,00	0,33
LVGC	CVENT	4,80	1,25	6,01
LVGC	CELV - P	7,50	1,50	11,25
LVGC	CELV - P	7,50	1,50	11,25

Table 14. Summary of the electrical power of every installation

3.4.4. Low voltage electrical installation

The low voltage electrical installation of the building is composed of the necessary elements for the correct protection of the equipment installed in each room and of the people entering and leaving each room by means of cutting and maneuvering devices installed in the electrical distribution panel and by a correct installation of grounding.

3.4.4.1. Electrical distribution panels

From the G.L.V.D.P of the underground floor the control panels and protection of the different zones and floors of the building will be fed constituting the secondary pictures.

In this way the secondary zone distribution panels will be fed directly from the main distribution panel, installing separate boxes for normal supply and preferential supply.

This double supply will be executed by means of an automatic network switch, equipped with automatism platinum, which will be located in the general low voltage distribution panel.

3.4.4.2. General distribution panel

The table will be dimensioned in space and basic elements to expand its capacity by 30% of the initially planned.

The degree of protection will be from IP31 IK07 or IP55 IK10. The panel will be executed according to UNE-EN 60439 [21]. and UNE20451 [22].

Electrical characteristics:

- Nominal intensity <1000 A
- Assigned occupation voltage <1000 V
- Assignment voltage of isolation 1000 V
- Short-term admissible current: 85 kA eff / 1sg
- Admissible crest current: 187 kA

3.4.4.3. Protection elements

All outputs will be formed by low voltage automatic switches in a moulded box that must meet the conditions set in the Technical Specifications (Compact Automatic Switches) [23], equipped with adjustable magnetotermic relays or electronic control units with the corresponding receivers.

The outputs corresponding to the preferred supply (network-group) will be equipped with remote control. Power of court: 25 kA eff (380/415 V).

3.4.4.4. Secondary distribution panels

In each zone a control panel and protection will be placed for the electrical circuits of its influence. All outputs will be formed by low voltage automatic switches in a moulded box that will have to comply with the conditions set in the boxes and their components will be designed according to the following standards: UNE-EN 60439.1, UNE-EN 60439.3 [21] and UNE 20451 [22].

Electrical characteristics:

- Nominal intensity: <630 A
- Function voltage: <1,000 V
- Isolation voltage: 1,000 V
- Short-term admissible current: 25 kA eff / 1 sg
- Stream of admissible crest (50 Hz): 53 kA

There will be a separate panel for the power supply to various computer and central services fed by the emergency circuit (EG) and UPS with the totality differential protection of class A. Automatic capacitor batteries will be placed to compensate the power factor of the installation, in the outputs L.V. of the G.L.V.D.P using a global compensation, to benefit from the following advantages:

- Suppress penalties for excessive consumption of reactive energy.
- Adjust the apparent power to the actual need of the installation.
- Download the transformation center (power available in kW).

Capacitor batteries will be sized to obtain a power factor of 0.95 with the purpose of avoiding payment in the form of reactive energy and obtain, if it is possible, a bonus over the terms of energy and power of this concept. The capacitor batteries will be made up of complete units with control counters and over-sized capacitors at 470 V voltage and tuned anti-harmonic inductors, tested at the factory and lists to be connected to the network. The base unit will be composed of a regulator that maintains the power factor at a given value, connecting or disconnecting unitary capacitors called steps. This basic unit already constitutes, in itself, an automatic battery of small power. The plan IFO-01.9A shows the distribution of the distribution panels in every floor.

3.4.5. Lighting

The average levels of illumination provided for the different areas of the building are as follows, according to UNE-EN 12464-1: 2003 [24]:

- Pool and gym: 300 lux
- Multipurpose rooms, meeting, office, meetings: 300 lux
- Circulation and corridors: 150 lux
- Technical locals, Kitchen: 300 lux
- Rooms: 150 lux

It has been chosen mainly for the use of fitted lighting type down lights, equipped with a support system adapted to the ceiling, with LED lights.

Following the requirements set out in the ITC-BT-28 instruction [25], an emergency lighting system (safety or replacement) will be provided to prevent any possible lack of normal lighting for breakdowns or deficiencies in the network supply.

Security lighting will allow people to safely evacuate and must work for at least 1 hour.

- Illumination of evacuation: It will provide at the level of ground in the axis of the main steps a horizontal luminance minimum of 1 lux. In the points with fire protection installations and electrical lighting panels, the minimum luminance will be 5 lux.

The start-up of the emergency lighting system will be automatically carried out when a voltage failure occurs in the supply network or when it drops 70% of its nominal value.

In plans IEL-01 it is possible to see the situation of the lights in every floor.

3.4.6. Photovoltaic energy

To know the energy supplied thanks to the photovoltaic panels it is necessary to follow specific steps. The first one is to calculate the solar radiation in the working zone. The table 15 shows the radiation in the location of the building.

Province:	Barcelona	
Latitude of calculation:	41.40	
Latitude [º/min.]:	41.24	
Altitude [m]:	95.00	
Average relative humidity [%]:	68.00	
Average speed of the wind [Km/h]:	8.00	
Maximum temperature in summer [ºC]:	31.00	
Minimum temperature in winter[ºC]:	2.00	
Daytime variation	8.00	
Degree-day. Base temperature 15/15 (UNE 24046):	622.70	(November/March period)
Degree-day. Base temperature 15/15 (UNE 24046):	656	(The whole year)

Months	Januay	February	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Anual
Average ambient Tª.[ºC]:	9,40	9,90	12,30	14,60	17,70	21,60	24,40	24,20	21,70	17,50	13,50	10,20	16,4
Average water network Tª. [ºC]:	12,0	13,2	14,4	15,6	16,8	18,0	19,2	18,0	16,8	15,6	14,4	13,2	15,6
Horizontal rad. [kJ/m^2/day]:	6.196	10.006	13.606	18.170	21.272	22.734	22.358	18.966	15.196	11.764	6.906	5.862	14.420
Inclination rad. [kJ/m^2/day]:	11.317	15.677	17.096	18.460	18.701	18.693	18.870	17.967	17.396	14.334	11.984	11.603	16.008

Table 15. Radiation of the place

The most unfavourable month of radiation, we observe that it is in December with 5862 kWh · m^2/day. So we will size the installation for the most unfavourable monthly conditions of isolation, and thus we make sure that we will cover the demand throughout the year.

Once we know the incident solar radiation, we divide it among the incident solar radiation that we use to calibrate the modules. (1 kW/m^2), and we will obtain the amount of peak sun hours (PSH). For practical purposes in our case this value does not change, but we will use the concept of PSH (peak sun hours) which is the equivalent number of hours that the sun would have to shine at an intensity of 1000 W/m^2 to obtain the total isolation of a day, since in reality the sun varies intensity throughout the day [26].

$$\text{PSH} = \frac{\text{solar radiation tables}}{1\text{kW/m2}} = 5862 \text{ HSP} \quad (4)$$

The second step is to calculate the number of necessary panels. The photovoltaic installation will not cover the whole consumption of the building so the goal is to cover the maximum power installing the maximum panels in the roof. The dimensions of the roof are 24 x 13 m and the dimensions of a standard panel are 1,6 x 0,9 m. The distribution of the panels in the roof will be 14 rows of 15 panels each. A total of 210 panels of 250 W each one. The total power of the photovoltaic installation will be of 52500 W.

Finally, we would only have to choose a charge regulator and a direct current to AC converter to be able to have 220 V alternative current in our house suitable for any type of application.

The charge regulators are determined by the maximum work intensity and by the voltage in which we have designed our installation.

Micro inverter VS String

There are two types of inverters. The micro inverter converts the electrical current of one or two panels and the string converts the power of the whole installation.

Below there is the table 16 that compares the different characteristics of each one [27], [28] and [29].

	Micro inverter	**String inverter**
Guarantee	20 years	10-15 years
Power	maximum of every module	worse module in series
Shadow effect	doesn't affect	affect
Monitoring	individual	global
Sizing	Simple and fast	Complex
	No need of wiring and protections in CC	
Cost	High	Low
Efficiency	90%	96%
Time of work	High	Low
	It creates hot that is bad for the panel and micro inverter	
Electrical protection for overvoltage	No need of wiring and protections in CC	yes

Table 16. Comparison of micro inverters and string

Taking account that the installation of the building covers a lot of power is more efficient to have a string inverter in our specific case, but it is important to know that the micro inverters are being an interesting alternative for photovoltaic installations.

The figure 14 shows a schematic description of a photovoltaic installation system.

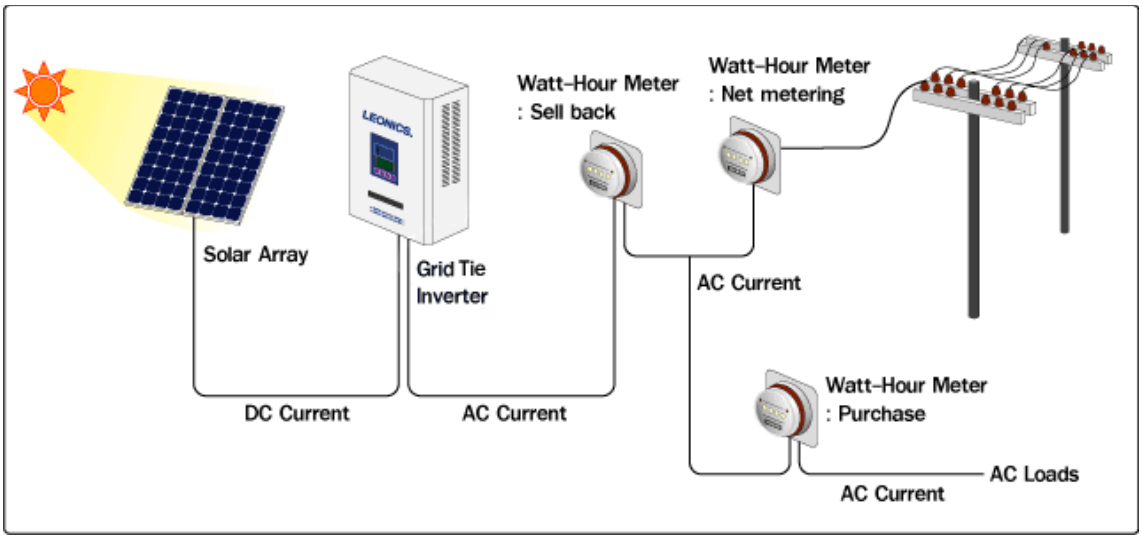

Figure 14. Scheme of photovoltaic installation system [5].

The power of the DC/AC converter will have to be chosen based on the sum of all the nominal powers of the consuming equipment multiplied by the coefficient of simultaneity of use of these (usually values ranging from 0.5-0.7). In our case, the total estimated power is 52500 W.

Converter power = 52500 W · 0.7 = 36750 W

So, with a 40000 W converter it would be enough for our example, as long as we really use only the devices initially considered. We can always establish a higher power in case some other household appliance of higher consumption is used.

3.4.7. Intern installation

The interior plant installation will be executed with the following elements:

Cables:

- Power: It will be made with copper conductors with cross linked polyethylene insulation and polyolefin cover for 1,000 V with designation RZ1 0.6/1kV according to UNE 21123 part 4 or 5.
- Control: It will be done with copper conductors with PVC insulation for 500 V designation H05 * VV-F.

Tubes:

- Execution surface: They will be rigid insulators armoured of PVC, will comply with norm UNE-EN 50086
- Embedded execution: They will be PVC double layer protection level 7.

Trays:

- They will be of PVC M1, will be provided of cover, removable and last separators.

Boxes:

- Surface: They will be insulating material of great mechanical and self-extinguishing resistance.
- Enclosed: They will be of Bakelite, with great dielectric resistance. As a general rule, all boxes should be marked with the names of distribution circuits.

For the placement of the drivers, it will be followed the ITC-BT-20 Instruction. The minimum nominal outer diameters for the protective tubes according to the number, class and section of the conductors that must be housed, according to the installation system and the tube class, will be those set in the ITC-BT-21 instruction.

Derivative boxes will be equipped with adjustment elements for the entry of tubes. The dimensions of these boxes will be such that they allow to lodge softly all the conductors that they must contain. Its depth will equalize, at least, to the diameter of the tube greater plus 50% of the same, with a minimum of 40 mm for its depth and 60 mm for the diameter or inner side.

In any case the union of drivers will be allowed, such as joints or leads by simple, but must always be carried out using connecting terminals mounted individually or constituting blocks or connection rules; it can also be allowed the use of flanges of connection.

The lines on trays that run through the interior of technical floors or registrable trenches will be constituted by copper conductors with polyethylene isolation reticulated for 1,000 V of service, RV designation 0.6 /1 KV/ RZ1 0.6/1Kv.

3.4.8. Post to earth

The grounding of the elements that make up the electrical installation will start from the general distribution panel which will be linked to the main grounding network that will be in the building. Protective conductors will be channelled preferably with a common envelope with the assets and in any case their layout will be parallel to these and will present the same insulation characteristics. In the installations of the locals that contain a bathtub or shower the volumes set in the ITC-BT-27 will be respected [31]. The current outlet located next to the mirror will be safe, with isolation transformer.

An equipotential connection will be made between the metallic pipes, the accessible metal parts and external conductive parts such as bathtubs and metal showers, in accordance with the ITC-BT-27 instruction [31]. Grounding installations will be carried out in accordance with the conditions indicated in ITC-BT-18 [32], ITC-BT-19 [33], NTE IEP Standards regulations and Technical Specifications (Grounding) [34].

Plan IFO-01.10 shows the different points of grounding system of the building.

The figure 15 shows a schematic description of a post to earth installation system.

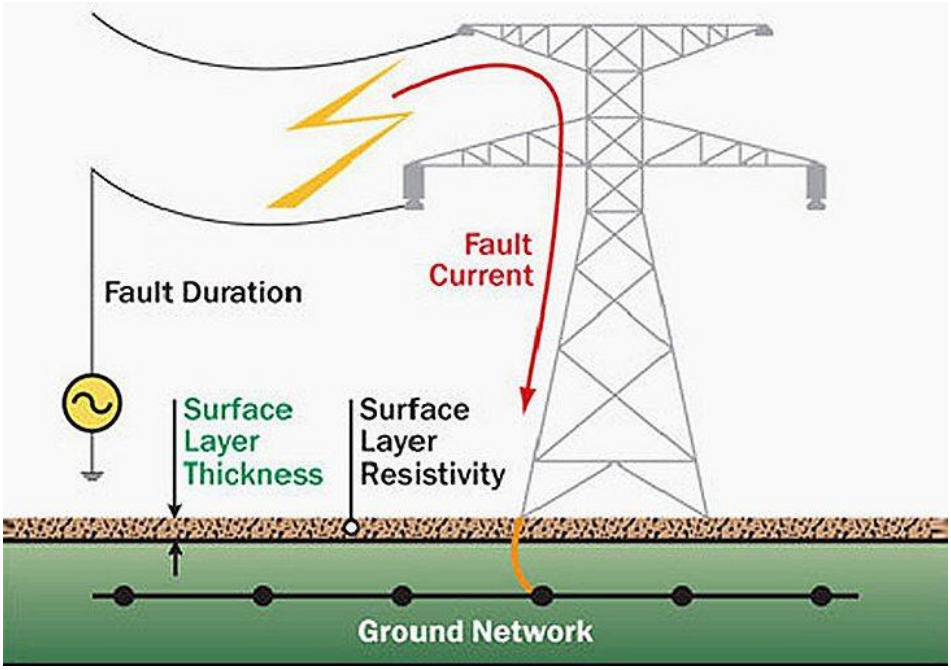

Figure 15. Scheme of post to earth installation [35].

3.5. INSTALLATION OF LIGHTNING ROD

Next installation explains the mechanism in case a lightning falls around the area of the building. It is necessary to follow the standards of that installation and it consists on capture the lightning, drive it to the floor and finally take it to the grounding system.

3.5.1. Electrical protection

The existence and continuity of the floor network of the building structure will be checked, with buried copper wire and peak electrodes, to guarantee a maximum resistance of 15 ohms.

A protection system against atmospheric discharges will be installed in the building, consisting of a collection set on a mast. The heads will be of the type PDC (lightning bolts with device of initiation, UNE-EN 21,186 [36]). The determination of the protection radius will be made on the basis of the UNE 21.186 [36]. A lightning bolt with lightning bolt counter will be installed as well as protectors with overvoltages.

The lightning bolts will be the highest point in the installation, remaining two meters above any other element to be protected.

The mast will be self-supporting tubular built in galvanized steel DIN 2440, with a nominal diameter of 1 1/2 inches and a height of 6 m. When a higher height is needed, sticks of the self-supporting telescopic type may be used. The anchors of the pole to walls or elements of the construction that stand out from the cover will not be separated more than 700 mm and will be made of galvanized steel. The number of these receivers will be calculated based on the protection radius indicated by the manufacturer so that the area to be protected completely is covered.

Plan IEL-01.8A shows the cover area of the lightning rod.

3.5.2. General description of the installation

The installation is made up of:

- Capture system
- Driver Network

• Earth Positioning System

By the aforementioned Standards regulations, the geographical area of Barcelona has a density of impacts of lightning on the ground of 1'27 impacts / year Km^2.

CAPTURE SYSTEM: It will be made up of an INGESCO-PDC Mod system header. 3.1 (75 meters of protection zone radius) IV level coupled to a galvanized iron tube of 6 meters in length fixed to the structure.

DRIVER NETWORK: There will be two downpads on the floor with a nude copper cable of 50 mm² in section. It will be placed a lightning control system composed of a CDR-1 counter and a PCS current meter device.

EARTH POST SYSTEM: A grounding system will be built according to UNE 21.186 standard [25]. The system will have a registration chest, electrodes (vertical and horizontal) and test bridge.

To obtain an adequate level of internal protection and to comply with current Standards regulations, it is necessary to apply protectors on those lines or sub-frames with a higher risk of suffering the consequences of overvoltages, in order to reduce this phenomenon in the safety of people, installations and equipment, as well as the guarantee of continuity of service.

We also detail the following protection proposal by placing lightning discharge modules according to categories:

- Protection at the main line level (CATEGORY III) and secondary or lower level distribution line (CATEGORY II) q Lightning discharge device. Cat. III / II tetrapolar 50 AC of discharge intensity (8/20)
- Fine protection for low power lines (CATEGORY I)
- Surge protector Cat. 1 for serial connection in single-phase lines (for lines up to 20 A). 7 CA is the maximum download intensity.

The figure 16 shows a schematic description of rod lighting installation system.

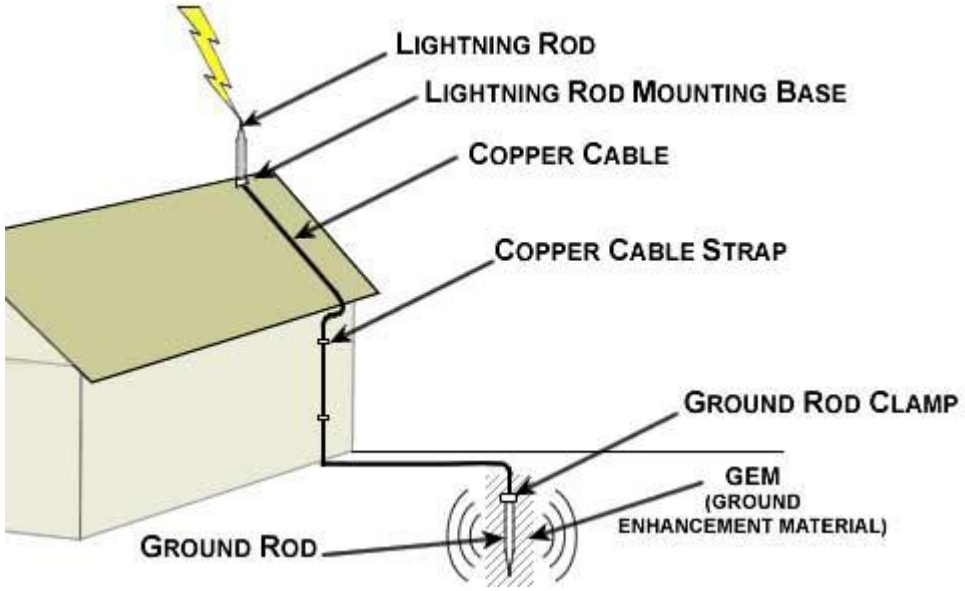

Figure 16. Scheme of rod lighting installation [7].

3.6. INSTALLATION OF TELECOMMUNICATIONS AND MEGAPHONE

This installation consists on install the different objects that are involved on telecommunications. They are for example, speakers, cameras, televisions, etc. The number of these objects depends on the characteristics of the building.

The elements that make up the telecommunications installation are formed by those elements that distribute the available telephony service and the broadband and Internet telecommunication services.

The objective is to provide the building with the necessary general telecommunications facilities considering the hardware, software and installation features. The design criteria of each element of the system will be based on the use of new technologies.

The different installations are supported by an adequate register and channelling infrastructure. The installations are radio, television and telephony, as well as internet. On the ground floor a RACK will be installed to support the equipment. There is an antenna at the covered plant. Megaphone system will be installed to transmit warnings and alarms.

The elements that are part of the installation are:

- OPTIMUS AMPLIFIER 240W 230V / 24V 1 UT.
- MICRO OPTIMUS FLEXO 25cm GONG PUPITRE 1 ut.
- ACUSTIC PROJECTOR 15W 100V IP-64 ABS 2ut.
- CEILING SPEAKER 6 "6W 100V PLASTIC 46 UT.

With regard to the television installation, television will be installed in all rooms and other points of common use. The building also has cameras in order to control specific places. In plans IVD-01 there are the distribution of the TV's, internet connectors and schuko sockets. There are also plans for megaphone installation (IME) and for CCTV (CCA) and they show the position of the different objects of these installations.

The following tables 17, 18 and 19 express the total number of units of megaphone, voice and data, and closed circuit television (CCTV) installations respectively.

MEGAPHONE (nº of units)		
Speaker	Ceiling speaker	rack
2	43	1

Table 17. Summary of the different units

VOICE AND DATA (nº of units)					
TV jack	Distribution rack	2 jack for network 2 jack for SAI 1 jack for data	2 jack for network 2 jack for SAI 2 jack for data	Antenna	register channel under pavement
22	1	20	21	1	3

Table 18. Summary of the different units

CCTV (nº of units)								
Minidomo interior	Minidomo exterior	Fixed camera	Varifocal camera	Computer of control	Videogravator	Lector	Room advisor	Opening pushbutton
13	1	8	4	1	1	3	18	1

Table 19. Summary of the different units

3.7. INSTALLATION OF FIRE PROTECTION

The fire protection system consists on select all the objects that have to be in a building in case of fire.

At first, it is important to calculate the detection system, that is enabled by the elements capable of detecting fire without human intervention that emit a signal that triggers the alarm so that the occupants have time to evacuate and thus avoid personal injuries.

In the extinction system, through extinguishing agents (water, dust, foam, dry ice), contained in fire extinguishers or driven by pipes that carry them to devices (hydrants, hydrants, sprinklers) that can work manually or automatically.

3.7.1. Standards regulation

For the definition of the Fire Protection Installations, the following Standards regulations, Norms and Ordinances have been considered:

• Standards regulation of Fire Protection Installations, Royal Decree 1942/1993, November 5, Ministry of Industry and Energy, BOE of December 14, 1993, and correction of BOE errors of May 7, 1994.

• ORDER of April 16, 1998 on rules of procedure and development of Royal Decree 1942/1993, of November 5, which approves the Standards regulation of Fire Protection Installations and revises Annex I and its appendices. BOE n. 101 of Tuesday, April 28, 1998.

• Standards regulation of Fire Safety in Industrial Establishments (RSCIEI). Royal Decree 2267/2004, of December 3, Ministry of Industry and Energy, BOE of December 17, 2004.

The following standards have also been considered for the design:

• UNE standards.

• NFPA standards.

• FM GLOBAL data-sheets.

• Standards and recommendations of the manufacturers of the equipment and materials to be installed.

3.7.2. Detection system

Installation is planned for all the building rooms. The installation of the analog system allows the control of the state of each detector, its identification and simultaneously to be able to act on the set of systems and devices that are connected to the detection system, and that as a security measure they will have to be driven; stop or start up of air conditioning machines.

Detectors

It is planned the installation of ion-type detectors in all the building's dependencies. The predicted detection system will be the analog, which will allow easier control of the installation and maintenance, and will entail the fast identification of the location of the emergency. The actuation of the detectors will involve the actuation from the central to the activation of acoustic warning and of the different maneuvers that are assigned to the detection system.

Alarm pushbutton

Distributed in different parts of the building, it is planned the installation of alarm buttons connected to the same analog detection system with the identification of each push button.

It has studied its location to be able to have a push button at a suitable distance, maximum 25 m in general, and next to the exits to the outside of the building (next to the fire mouths) and to a Height not exceeding 1,5 meters from the ground.

Acoustic alarm

As a means of warning noise, an alarm system has been planned by means of sirens using a control module on the detection bus, distributed by the building.

The automatic operation of this system will be commanded from the detection center through a management program.

Figure 17. Optic detector [38]

Figure 18. Alarm pushbutton [39]

Figure 19. Acoustic alarm [40]

The table 20 summarizes the number of detection units that the building has.

	Siren (nº of units)	Analog optical detector (nº of units)	Alarm button fires (nº of units)
-1	1	18	1
0	1	4	1
1	1	8	1
2	1	9	1
3	1	9	1
4	1	9	1
5	1	9	1
6		4	
TOTAL	7	70	7

Table 20. Summary of the different units in every floor

Detection center

The power station will be installed at the Reception. It will be modular, that is, the different functions are controlled by plug-in modules. It is pre-wired, that is, the type and quantity of modules that are plugged in will not require any cabling or wiring modification. It will be flexible, that is, the amount of modules can vary without making electrical or mechanical modifications to the power station. The number of lines must be variable from at least 4 to 96 individuals or groups. The control panel will identify the alarms by means of text on display, and may be separated from the main cabinet. All the circuits are watched and a breakdown is signposted. It has a light test button. It can signalize and command extinguishing systems.

Figure 20. Detection center [41].

Battery

The detection center must be electrically powered by at least two sources such that each of them has sufficient power to ensure the operation of the installation in the most unfavourable conditions. It is indispensable that the disturbance or failure of a source does not cause the malfunction of the other. One of the two sources of power must be constituted by a public or private electricity network; the other source must be a battery of accumulators. In cases of failure of the electrical network, the battery of accumulators must automatically feed the detection installation without interruption.

The power of the detection network from the public network will be a differentiated circuit that has its own fuse, derived as close as possible to the point of attachment to the network of the building in which there is the central of signage. It will be necessary to make sure that this circuit cannot be cut by mistake when cutting another one, such as the one of the lighting or force. If the accumulator is not in the immediate proximity of the signalling center, the cables of the circuit mentioned in the previous section must be positioned so that they are separated from the cables that connect the signalling center to the accumulator.

The accumulator will have technical characteristics such as ensuring, not only the constant and unlimited operation of the detection installation for at least 72 hours, but at all times the alarm systems for at least half an hour. Operating durations of less than 72 hours may be authorized, although they always exceed 24 hours, depending on the reliability of network failure detection and the likely repair duration. It will not be connected to the accumulator any other system than the installation of detectors.

Feeding from the public network should be such that it allows simultaneously ensuring not only the operation of the detection network and the alarm systems, but in the case of discharge of the accumulator, the existence of the load current maximum

The charging equipment will have technical characteristics to recharge, in a maximum of 24 hours, the accumulator totally unloaded, so that the alarm systems can work continuously for half an hour, at least, thanks to the accumulator. The recharge of the accumulator will be automatic.

The signalling and control center will indicate, at least through visual and sound signals, the failure of the power supply of the network and the accumulators. It is not necessary to indicate the simultaneous failure of the two sources.

3.7.3. Extinction

Equipped fire mouths (EFM)

It is planned to implant the fire mouths equipped on each floor of the building. The fire mouths are 25 mm long and 20m long, so that, if necessary, a quick and easy action for the building's personnel. The location of the EFMs has been studied in a way that allows action in any affected sector. The system will be fed with a 12 m3 tank located in a basement.

It is planned to have a pressure at the most unfavourable point of installation of 5 bar, exceeding the minimum necessary according to Standards regulations. To achieve this, pumping equipment consists of a main pump, an auxiliary pump connected to an electric group and a jockey pump.

Fire extinguishers

They will be installed in the polyvalent type (antispas) in those areas where the predicted risk is type A (carbonated solids) and CO2 where the planned risk is type B and / or E (fuels and electrical panels).

Figure 21. Fire extinguishers [42].

Dry column

The installation of a dry column consistent with an exclusive use of IPF41 fire brigade on the façade is planned, connected to a 80 mm diameter black iron pipe, which makes its route through a specially protected scale. There will be an IPF39 to plant 3 and another IPF39 to covered plant.

In plans ICI-01 there are the situation of the different fire protection objects in every floor.

The Table 21 summarizes the number of extinction units that the building has.

	EFM'S	portable dust extinguisher abc (nº of units)	portable fire extinguisher of co2 (nº of units)
-1	1	3	5
0	1	2	2
1	1	3	1
2	1	5	1
3	1	2	1
4	1	2	1
5	1	2	1
6		1	2
TOTAL	7	20	14

Table 21. Summary of the different units in every floor

4. CONCLUSION

In this section I will describe the conclusions that I have been able to extract with the realization of this project.

It should be noted that these conclusions are of a personal character way thanks to the completion of the project since this project is not a research project and therefore I should not arrive at any concrete result.

First of all, I would like to emphasize that with this project I have managed to understand what it is the process to calculate all the installations of a house and therefore I know how to measure the level of work involved in the realization of a project of these characteristics.

I have learned how to calculate the dimensions of the objects of each installation according to the conditions that affect them. And therefore, I have learned to use engineering programs with which I have arrived at the numbers calculated in each of the installations studied.

On the other hand, one of the conclusions that can be drawn is that the realization of this building with these characteristics does not mean big changes compared to a normal residential building. Since the characteristics of the facilities are global for all the buildings. It should be noted that the distribution of space must be taken into account in order to improve its mobility throughout the building.

Another conclusion is that in order to carry out a project of these characteristics, it is necessary to cover different branches of engineering since each installation focuses on different specific procedures of a branch.

In the project I have tried to get the most out of all the installations, although, due to my knowledge, I have not been able to reach 100% in all of them.

Even so, it has helped me to have a clear idea of all of them and, after this, be able to carry out projects of this magnitude and be aware of everything that requires the operation of a building, far beyond the lights and the airs conditioned.

There are many concepts that have to be taken into account for the correct functioning of all parts of a building. In addition, I have concluded that it is important to leave margins in all results and expand the numbers to have space for manoeuvre. That is, to a certain extent, it is necessary to oversize the installations to ensure that there is no deficiency in the system.

Finally, this work has given me a clear perspective of the steps to follow to make a building in all its dimensions and the large number of options you have to size any installation. It is a work space in which innovation is the daily bread and it is important to investigate new ways of designing the installations since more and more effective and powerful installations are being designed.

The market of companies that carry out these types of projects is very broad and that is why we have to compare and investigate which is the best option for the type of building in question both economically and potentially speaking.

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6. PLANS

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		FLOOR P3	IFO-01.5A
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		FLOOR P3	IME-01.5A
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		VERTICAL SCHEME	IFO-01.9A
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		FLOOR P2	IVD-01.3A
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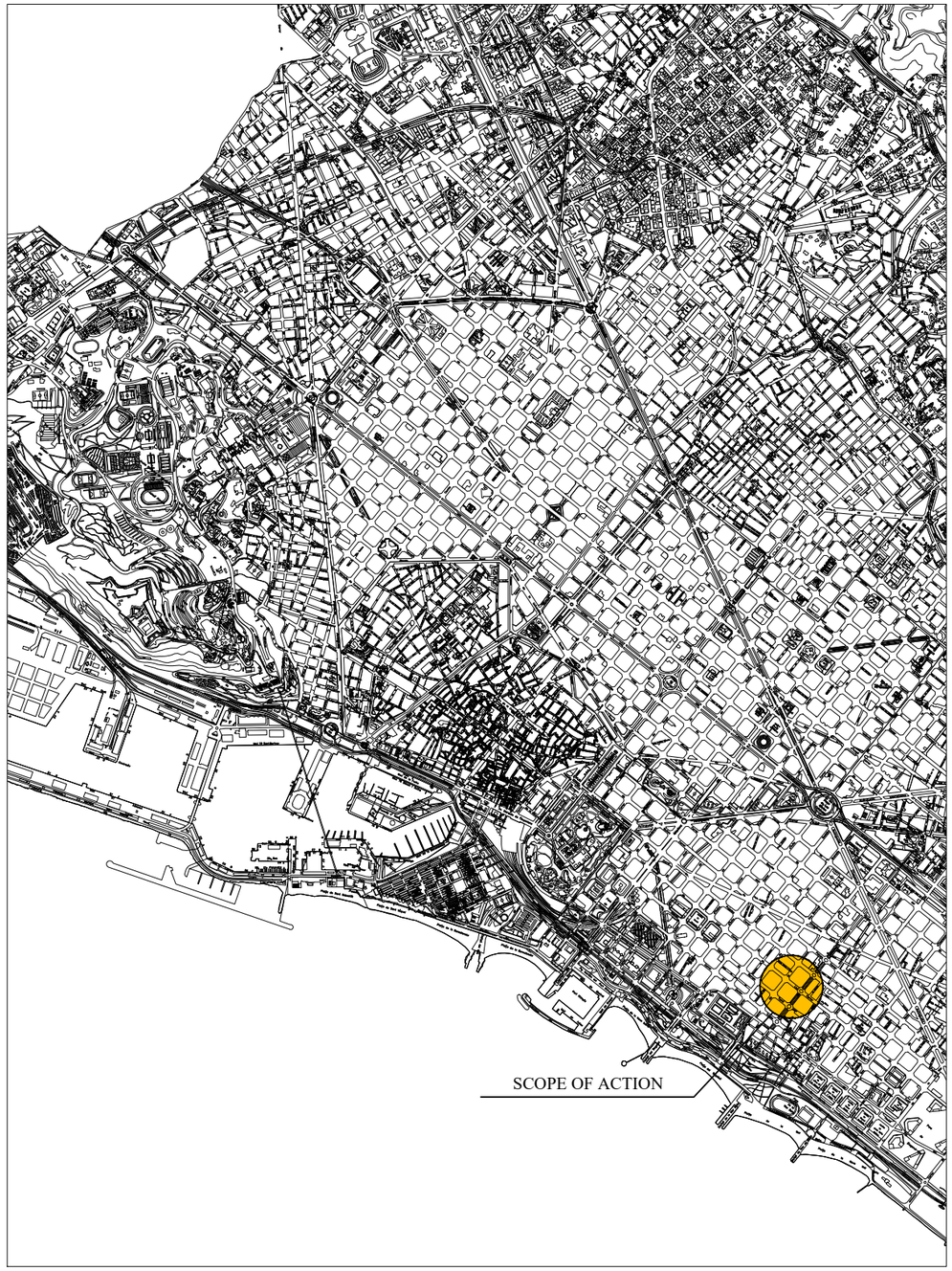
		FLOOR P3	IFA-01.5A
		FLOOR P4 AND 5	IFA-01.6A
		FLOOR P6	IFA-01.7A
		PRINCIPLE SCHEME DOMESTIC HOT WATER	IFA-01.8A



OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
INDEX AND SITUATION

AUTHOR:
ANA GONZÁLEZ PUEYO

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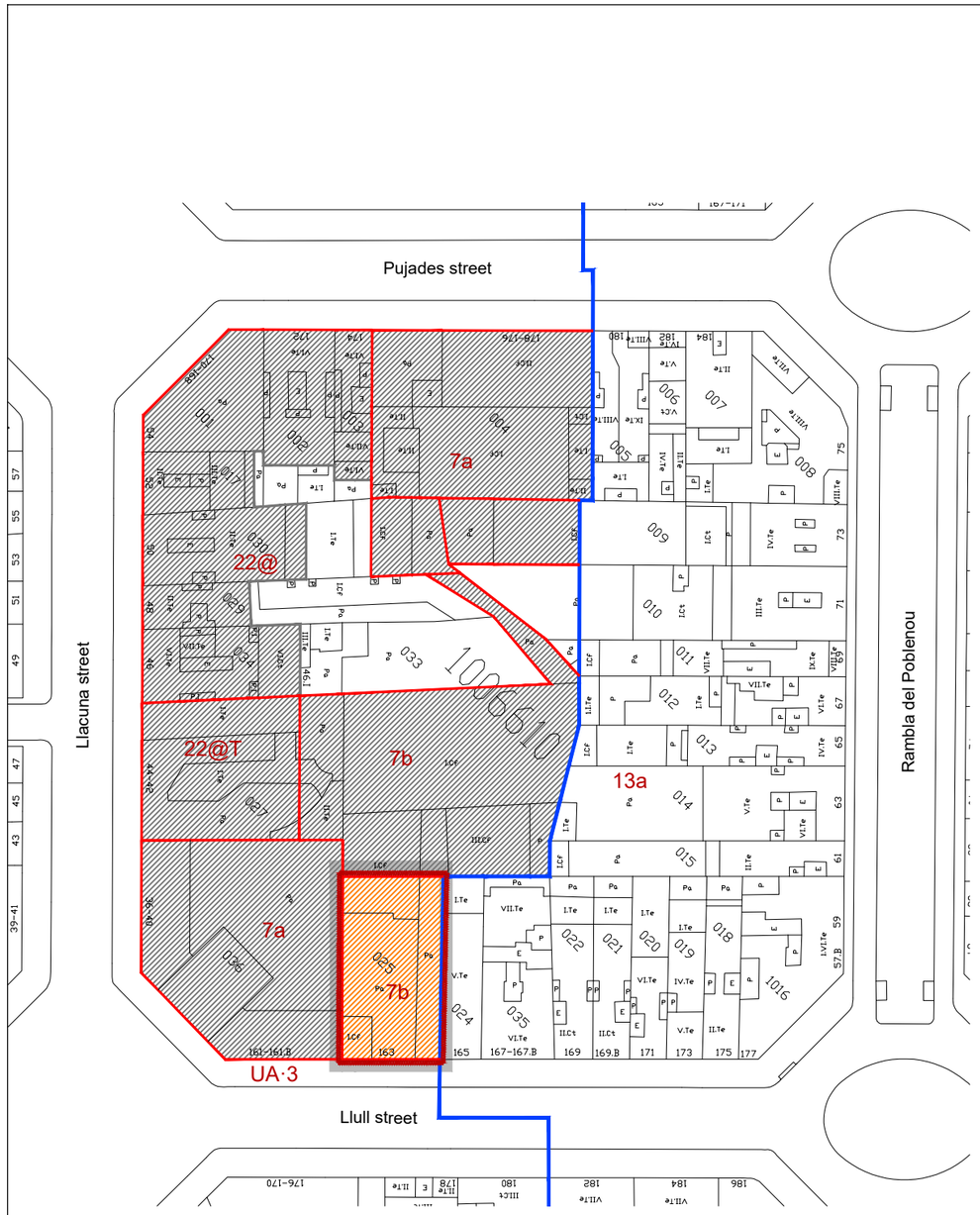

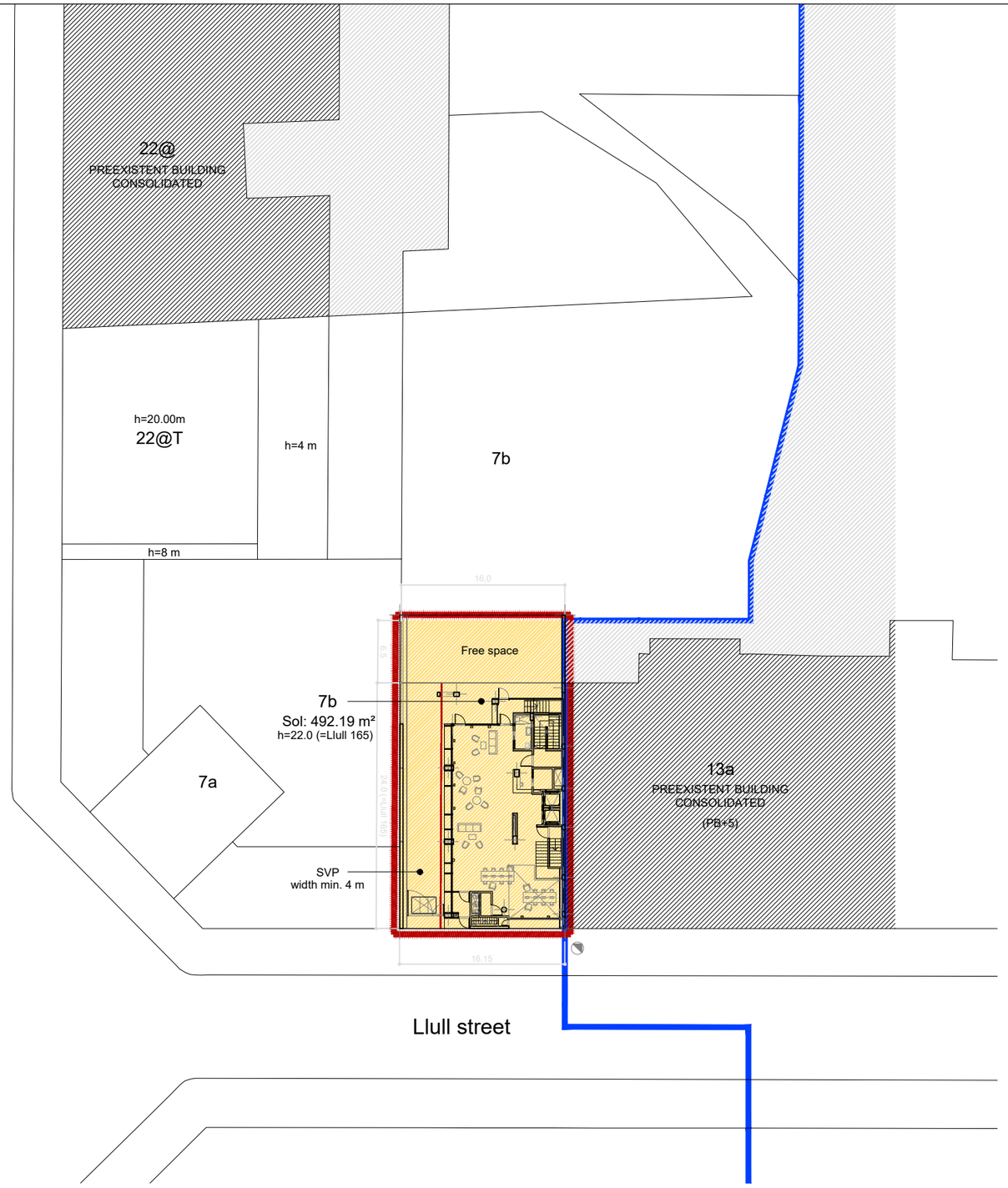

SURFACE SQUARE SPECIAL PLAN	
ROOF/ATTIC FLOOR	
F. 5	
F 4	
F 3	1840.8
F 2	
F 1	
GROUND F.	
BUILDING TOTAL	1840.8

OWNER:
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PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
URBANIZATION
GENERAL

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:		DATE:	FILE	No. PLAN:
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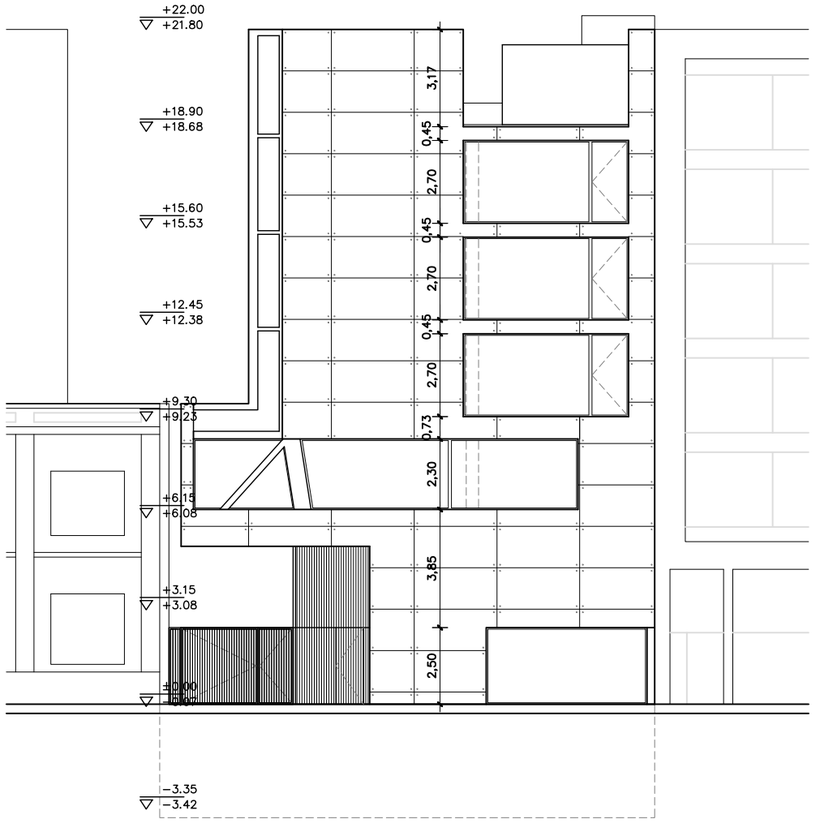

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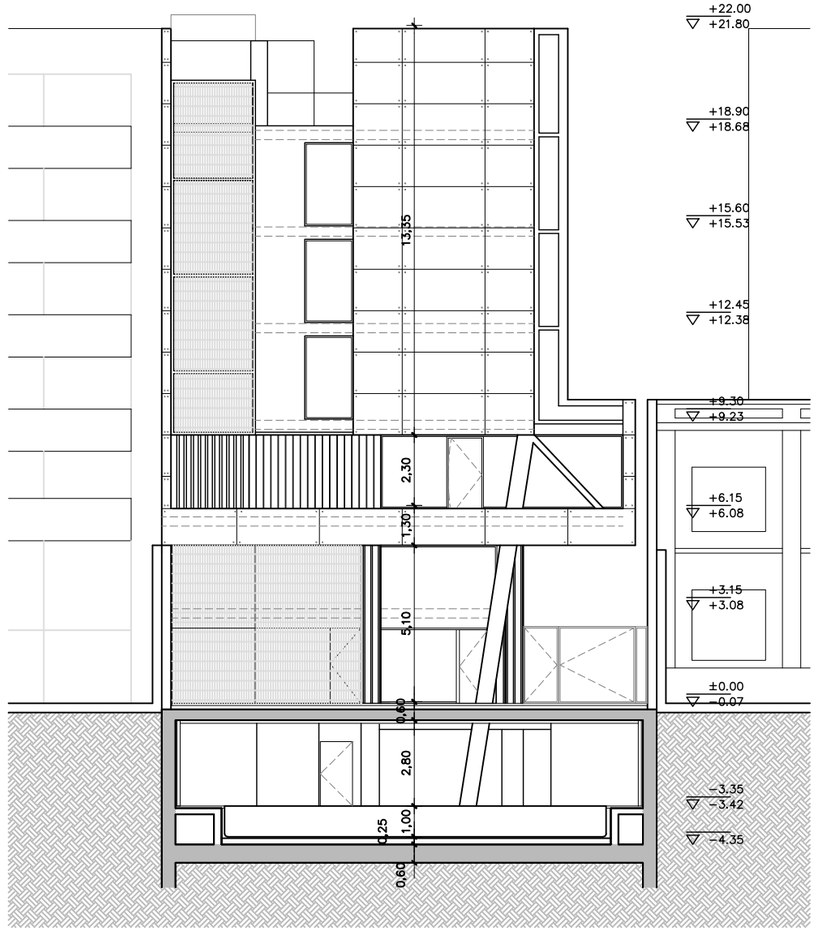

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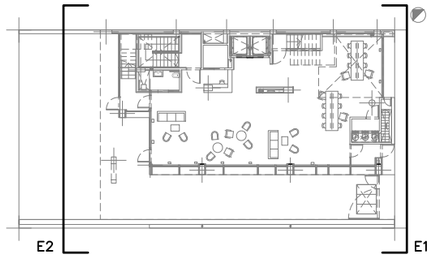

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PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
ELEVATIONS AND SECTIONS
ELEVATIONS 1 AND 2

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
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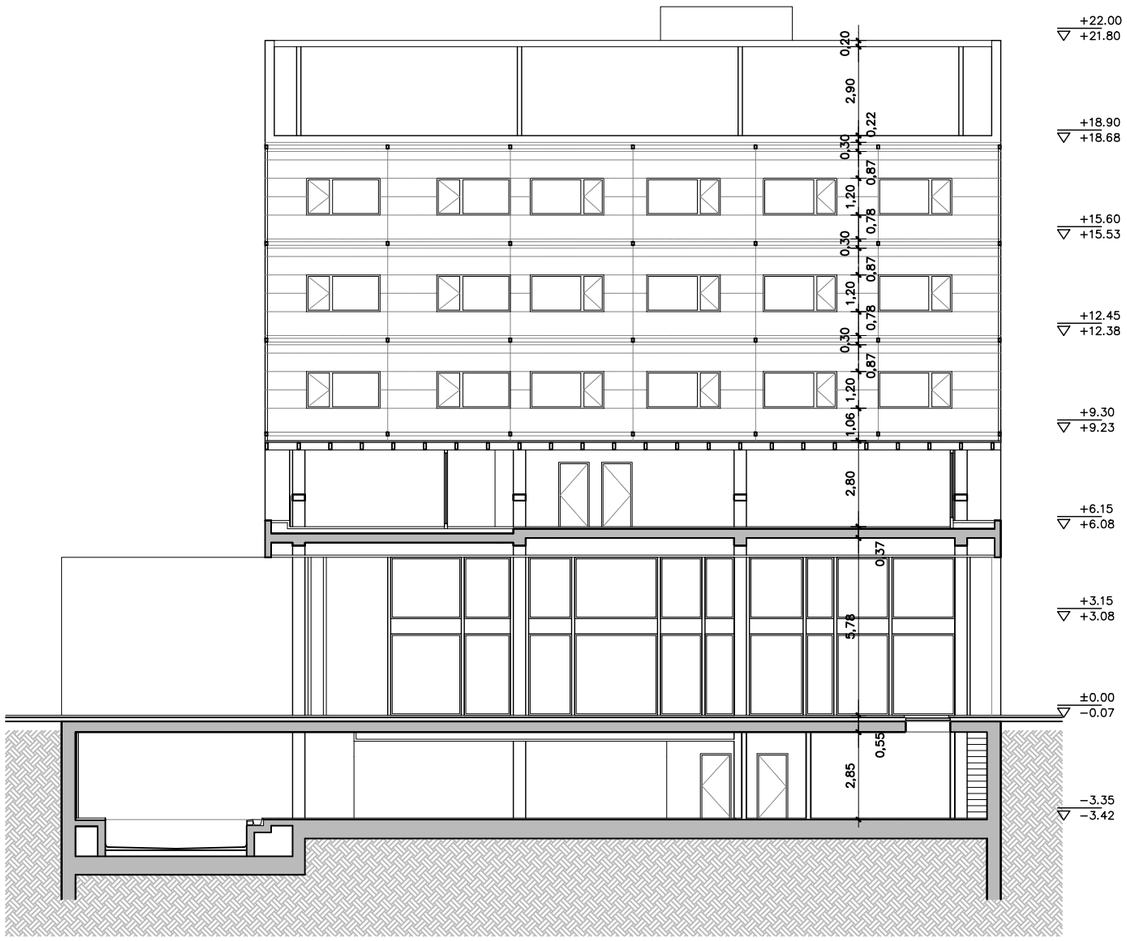
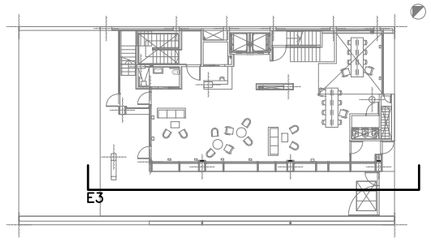


ELEVATION 3 – INTERIOR OF ISLAND COURTYARD



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PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:

ELEVATIONS AND SECTIONS
ELEVATION 3

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
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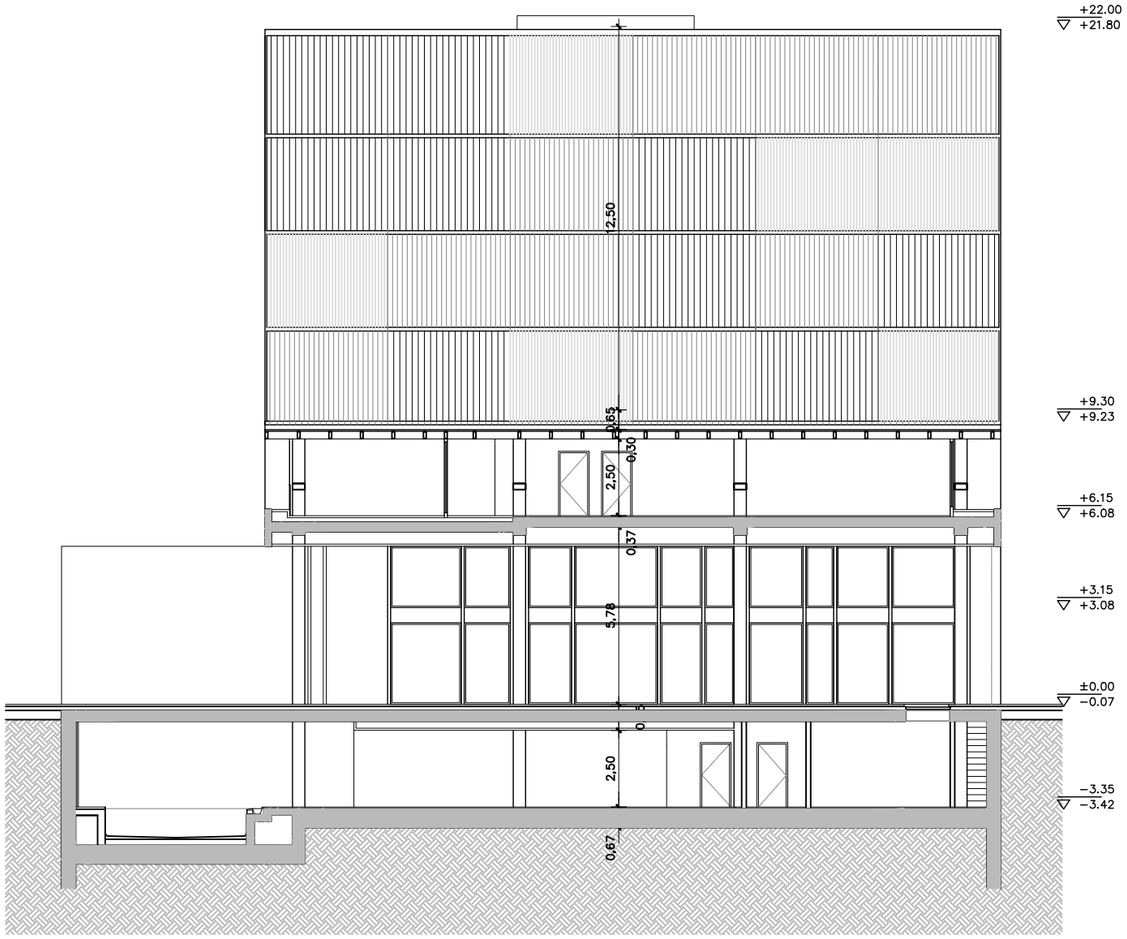
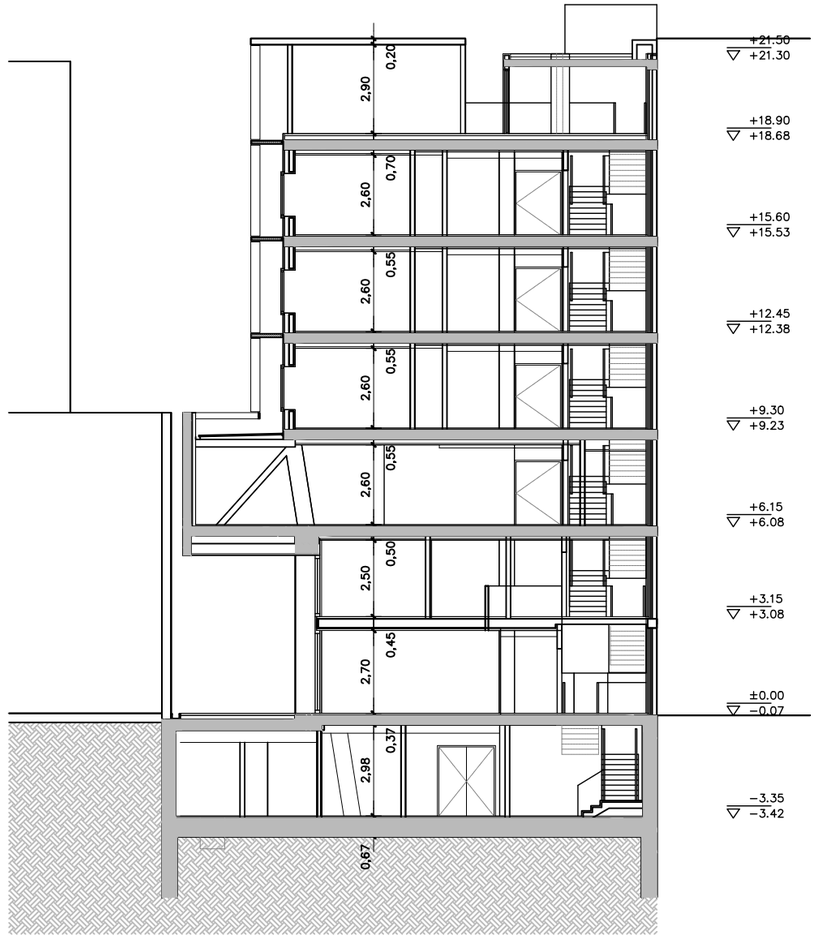


LONGITUDINAL SECTION LS1



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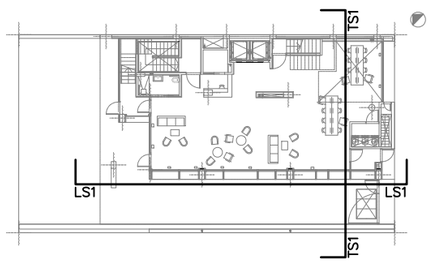


OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:

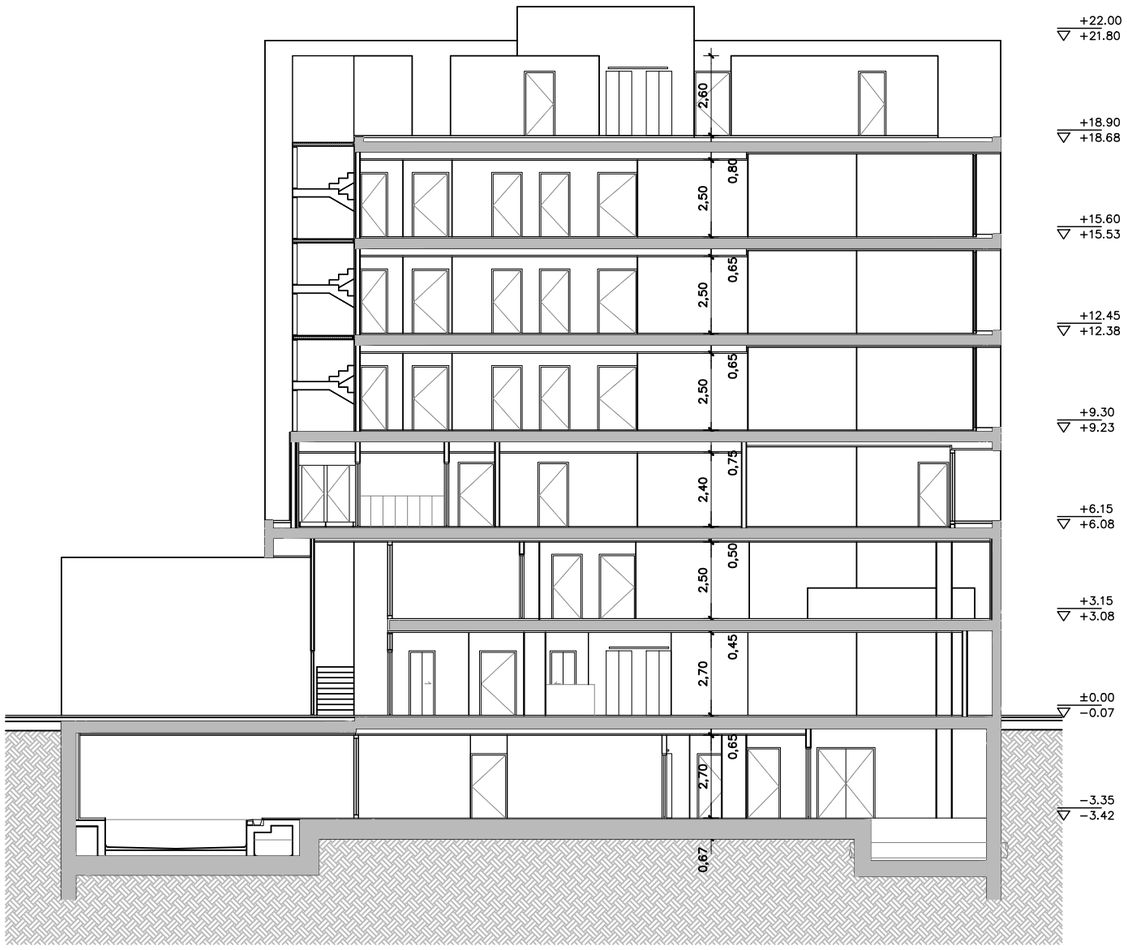
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:

ELEVATIONS AND SECTIONS
SL1 i ST1

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-ARQ-02.3A.dwg	ARQ-02.3A



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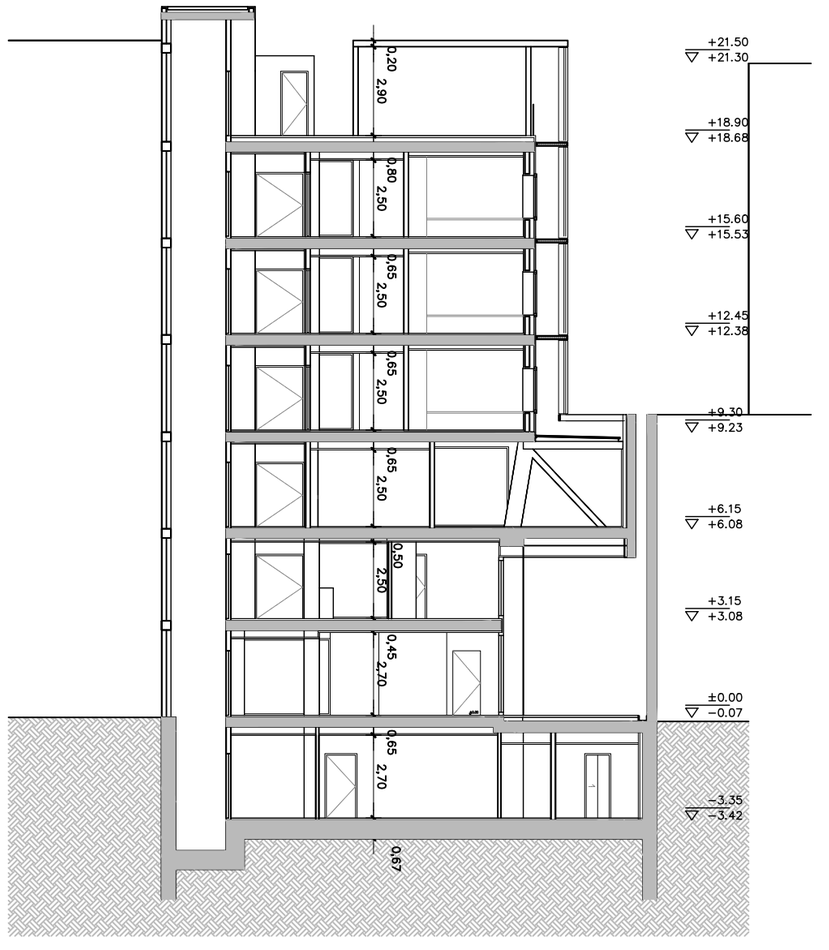

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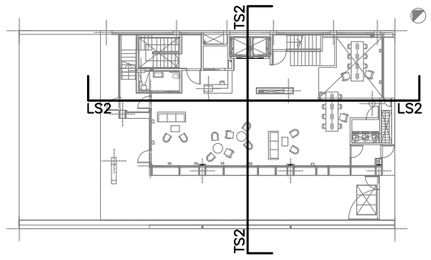

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PROJECT:

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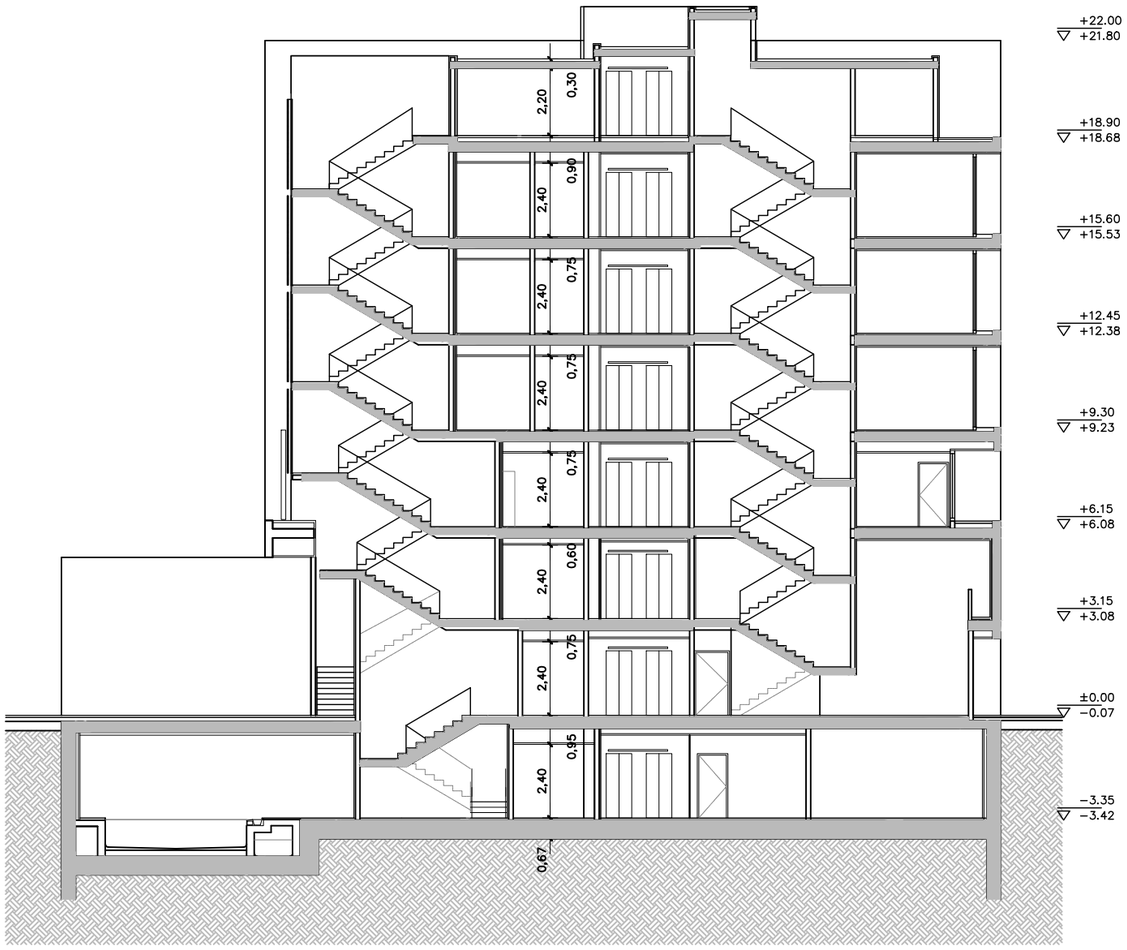
PLAN:

ELEVATIONS AND SECTIONS
SL2 i ST2

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-ARQ-02.4A.dwg	ARQ-02.4A



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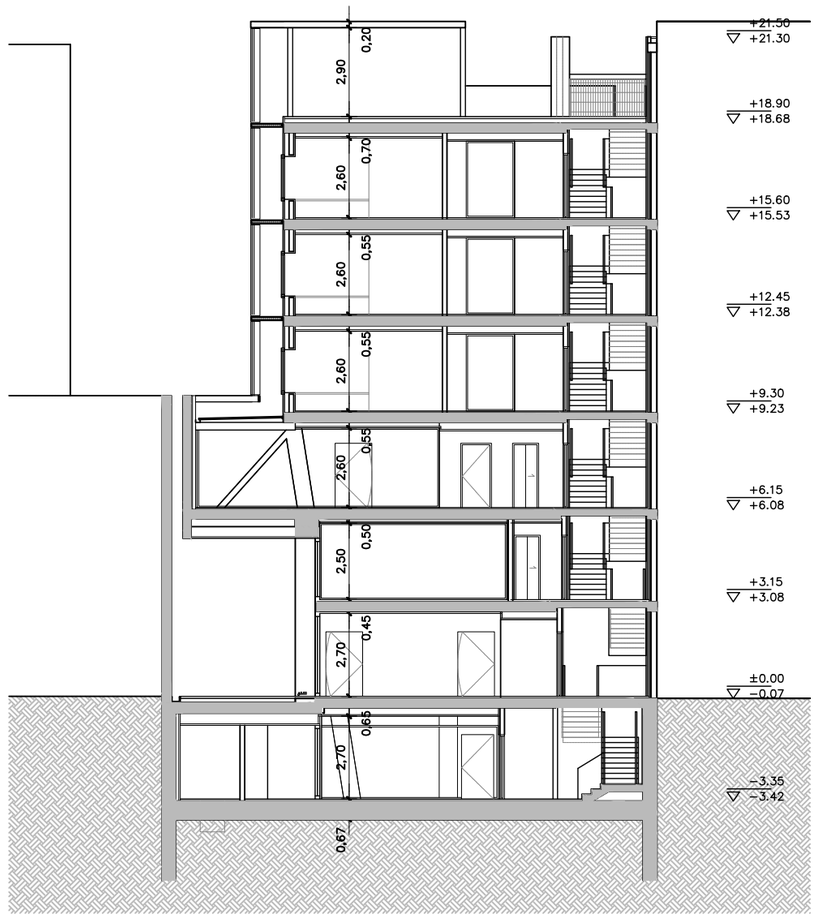

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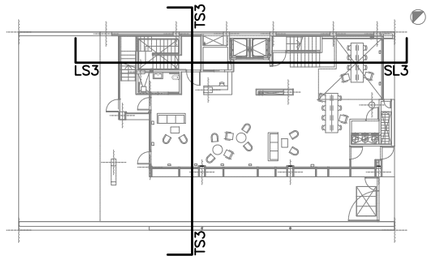

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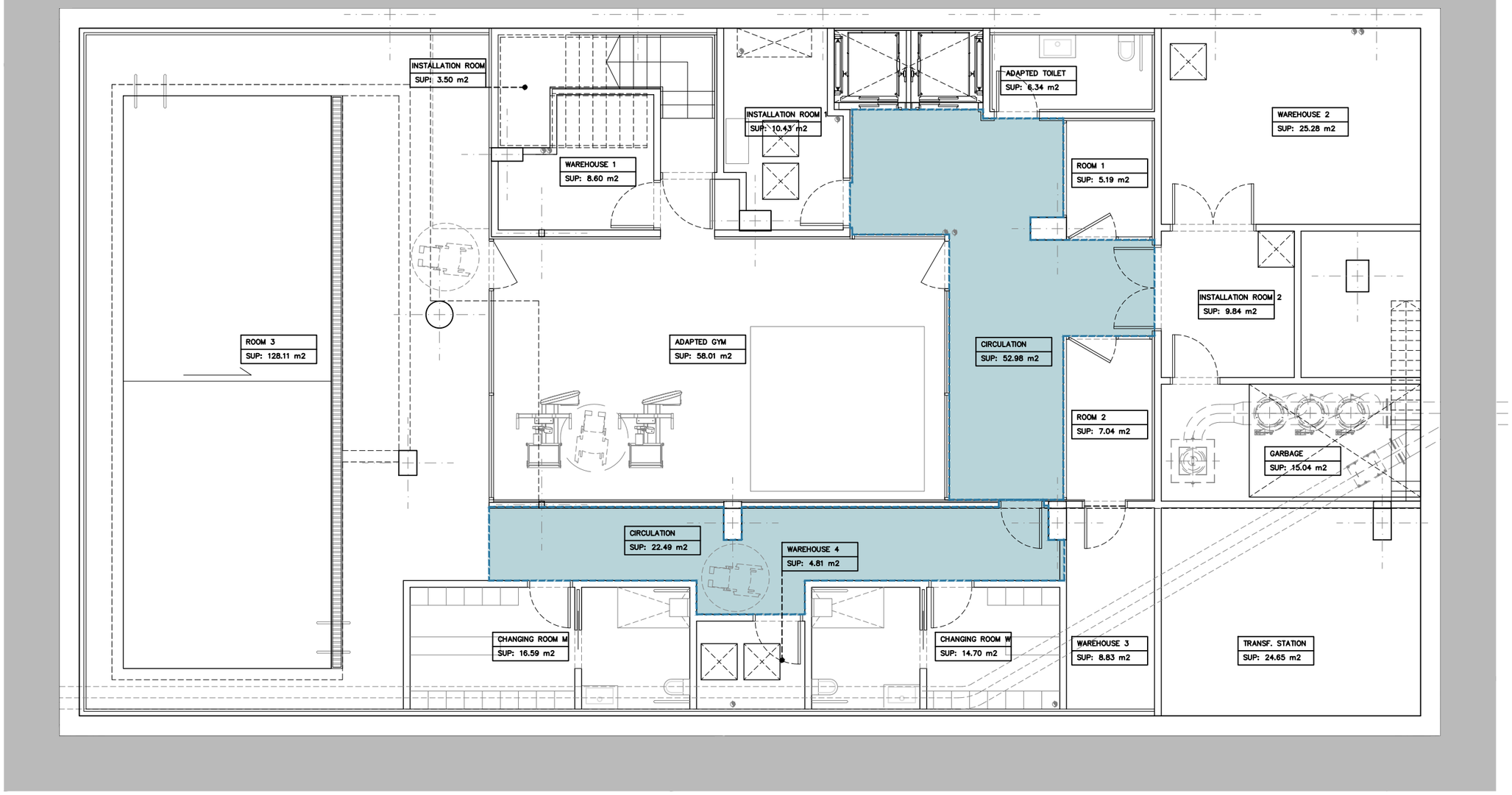
PLAN:

ELEVATIONS AND SECTIONS
SL3 i ST3

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-ARQ-02.5A.dwg	ARQ-02.5A



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PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS AND RELATED DISABILITIES

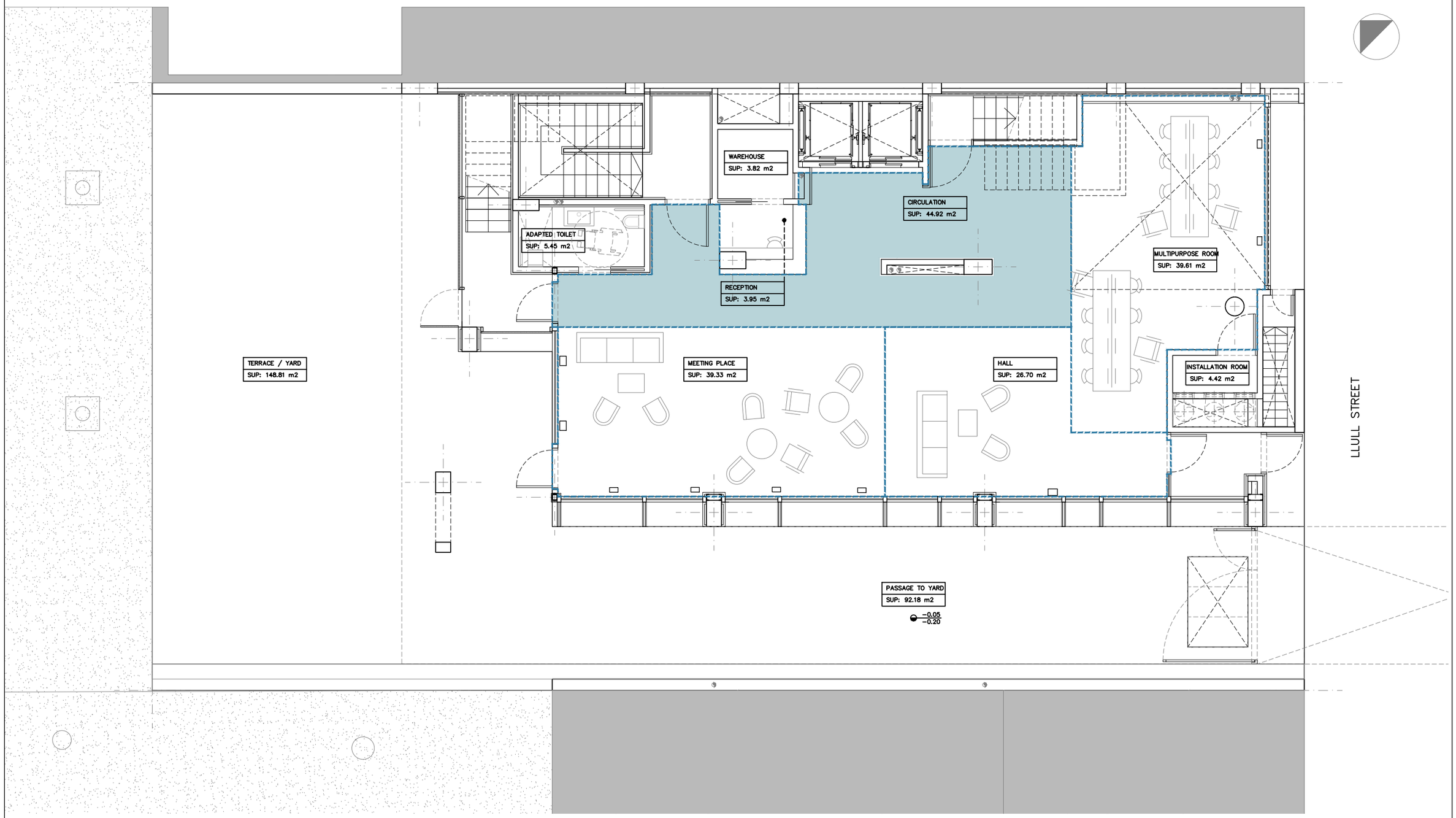
PLAN:

DISTRIBUTION AND SURFACES
UNDERGROUND FLOOR

AUTHOR:

ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/50 A3: 1/100	FEBRUARY 2018	A08002-E-ARQ-03.1A.dwg	ARQ-03.1A



OWNER:

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PROJECT:

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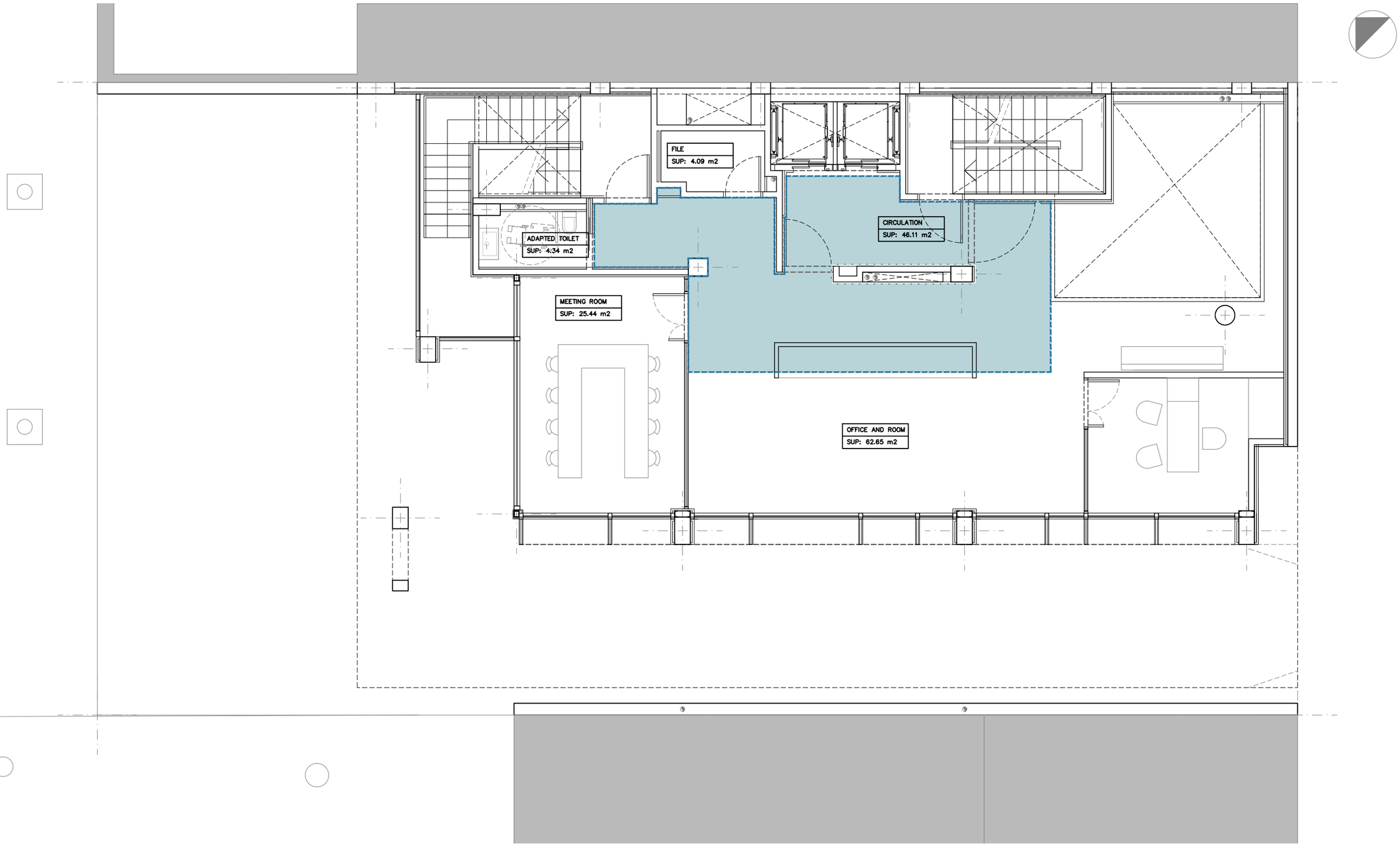
PLAN:

DISTRIBUTION AND SURFACES
GROUND FLOOR

AUTHOR:

ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/50 A3: 1/100	FEBRUARY 2018	A08002-E-ARQ-03.2A.dwg	ARQ-03.2A



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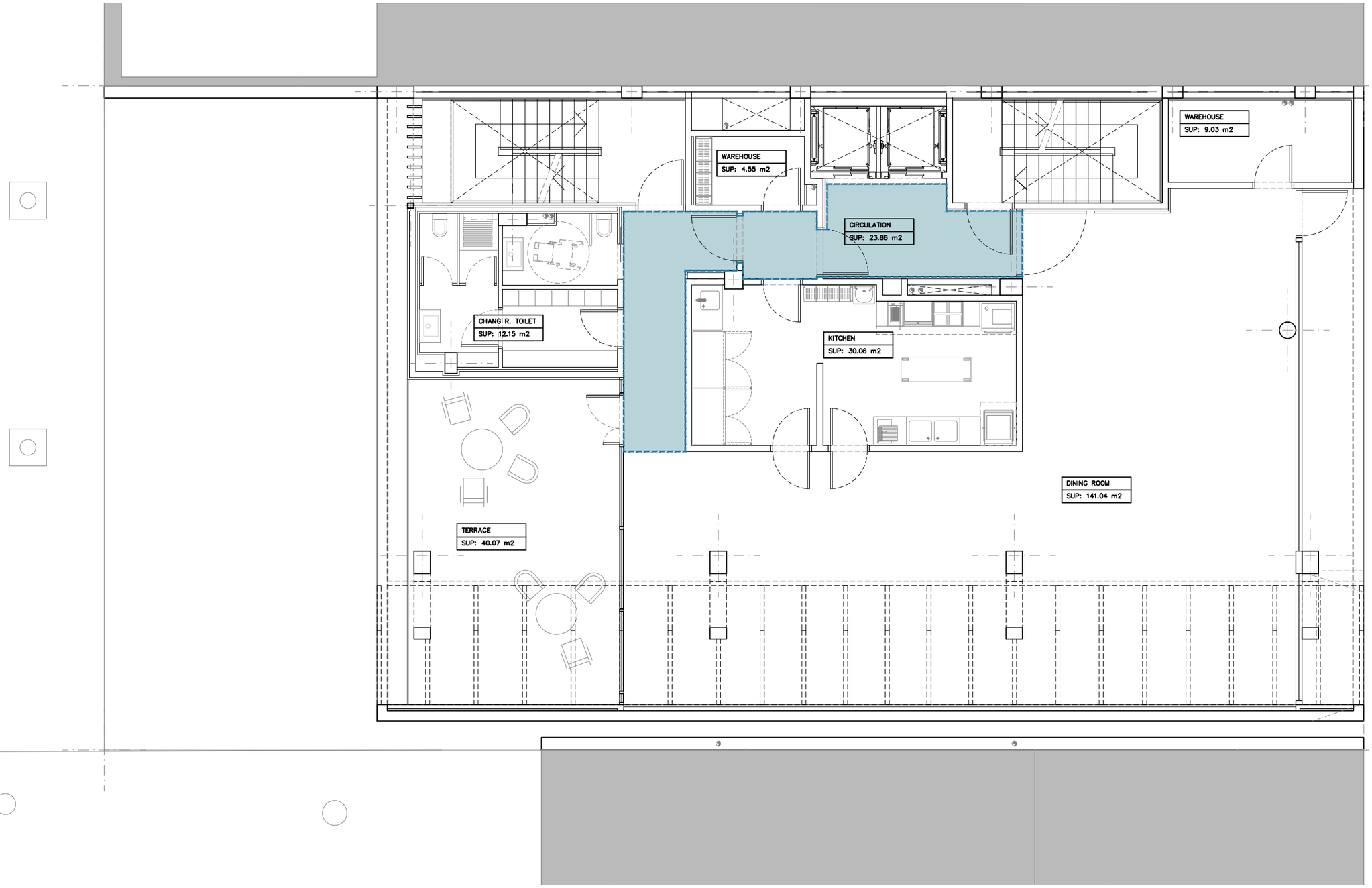
AND RELATED DISABILITIES

PLAN:

DISTRIBUTION AND SURFACES
FLOOR 1

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/50 A3: 1/100	FEBRUARY 2018	A08002-E-ARQ-03.3A.dwg	ARQ-03.3A

AUTHOR:
ANA GONZÁLEZ PUEYO



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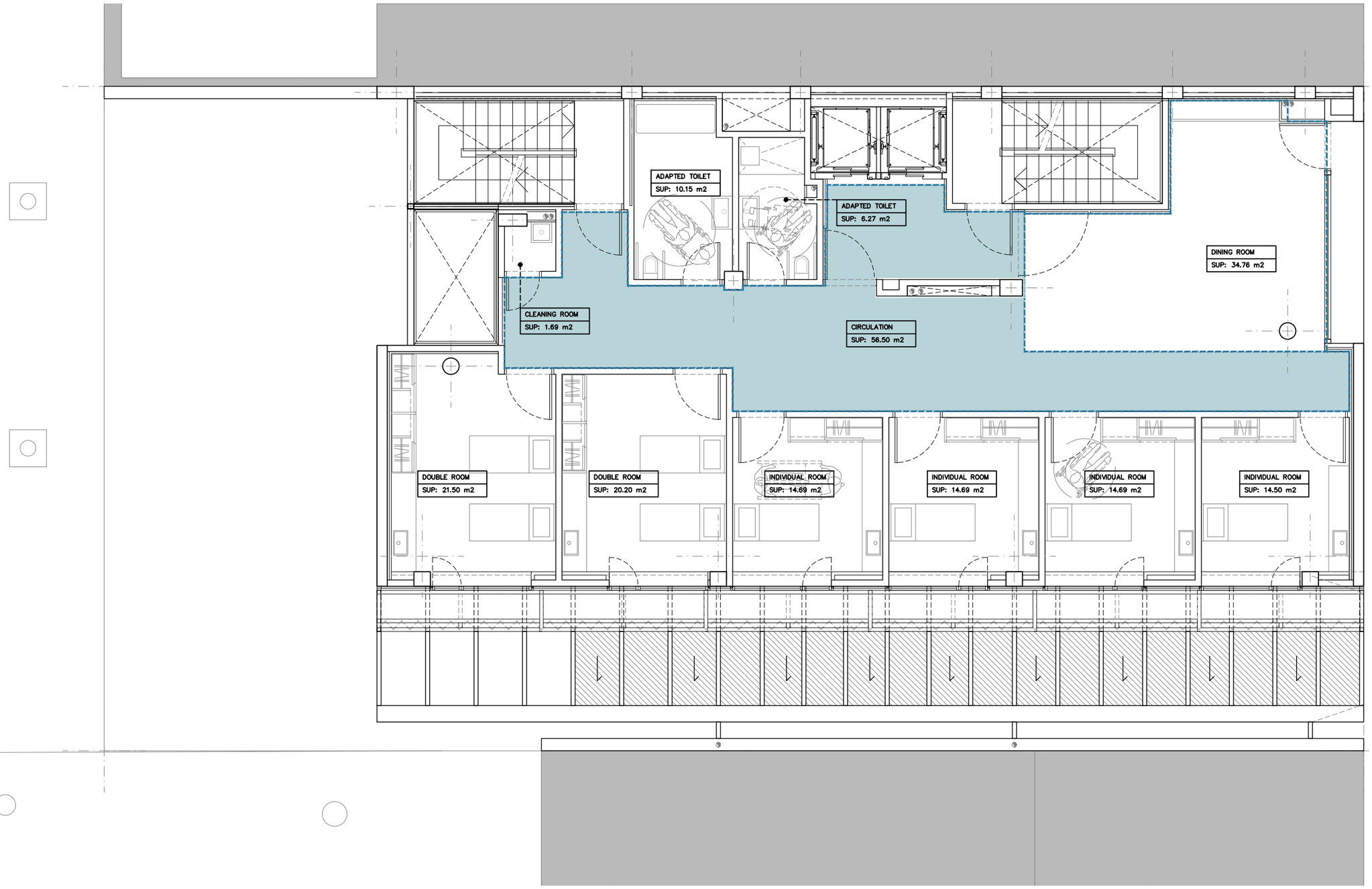
PLAN:

DISTRIBUTION AND SURFACES
FLOOR 2

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/50 A3: 1/100	FEBRUARY 2018	A08002-E-ARQ-03.4A.dwg	ARQ-03.4A



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PROJECT:

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AND RELATED DISABILITIES

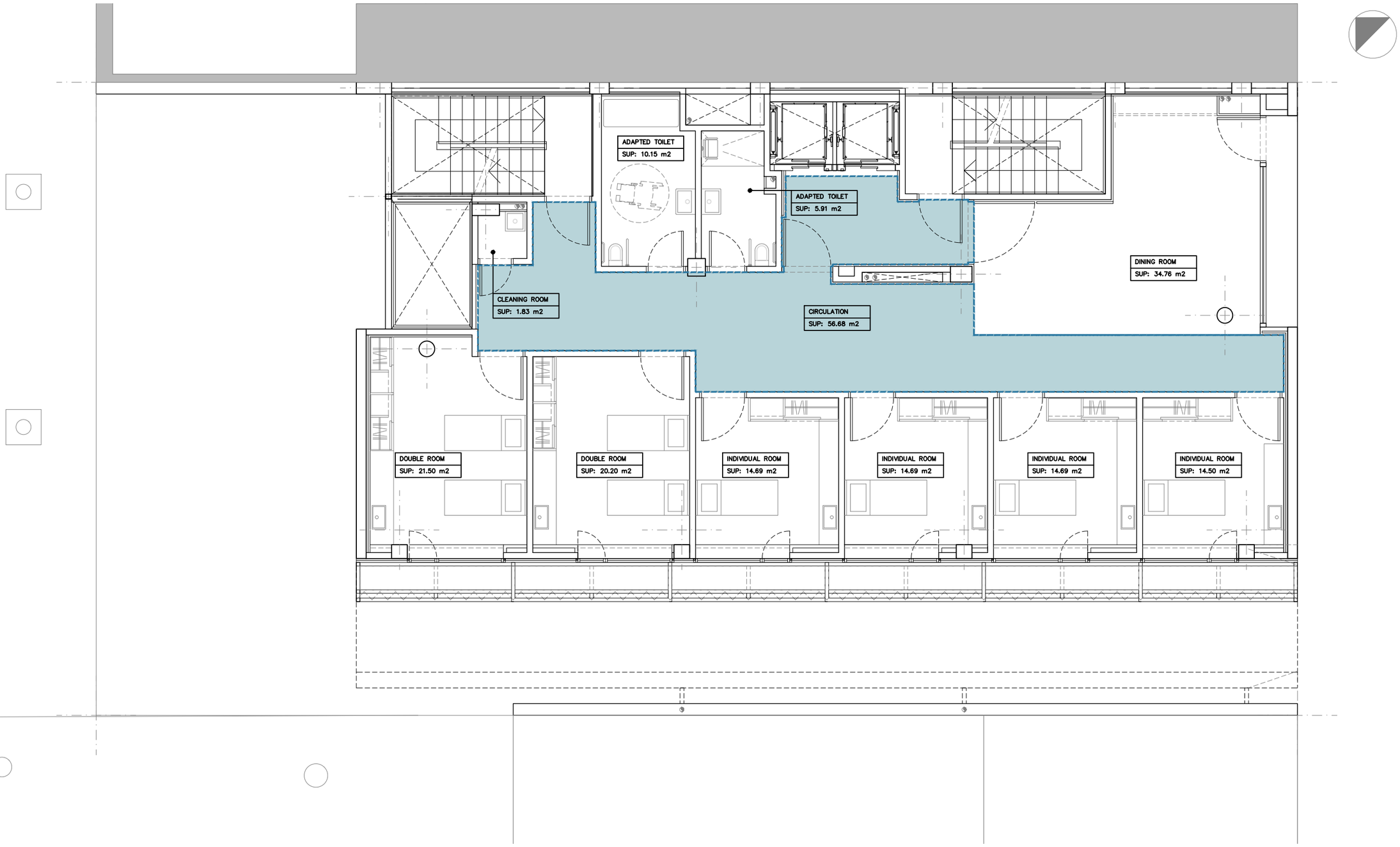
PLAN:

DISTRIBUTION AND SURFACES
FLOOR 3

AUTHOR:

ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/50 A3: 1/100	FEBRUARY 2018	A08002-E-ARQ-03.5A.dwg	ARQ-03.5A



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PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

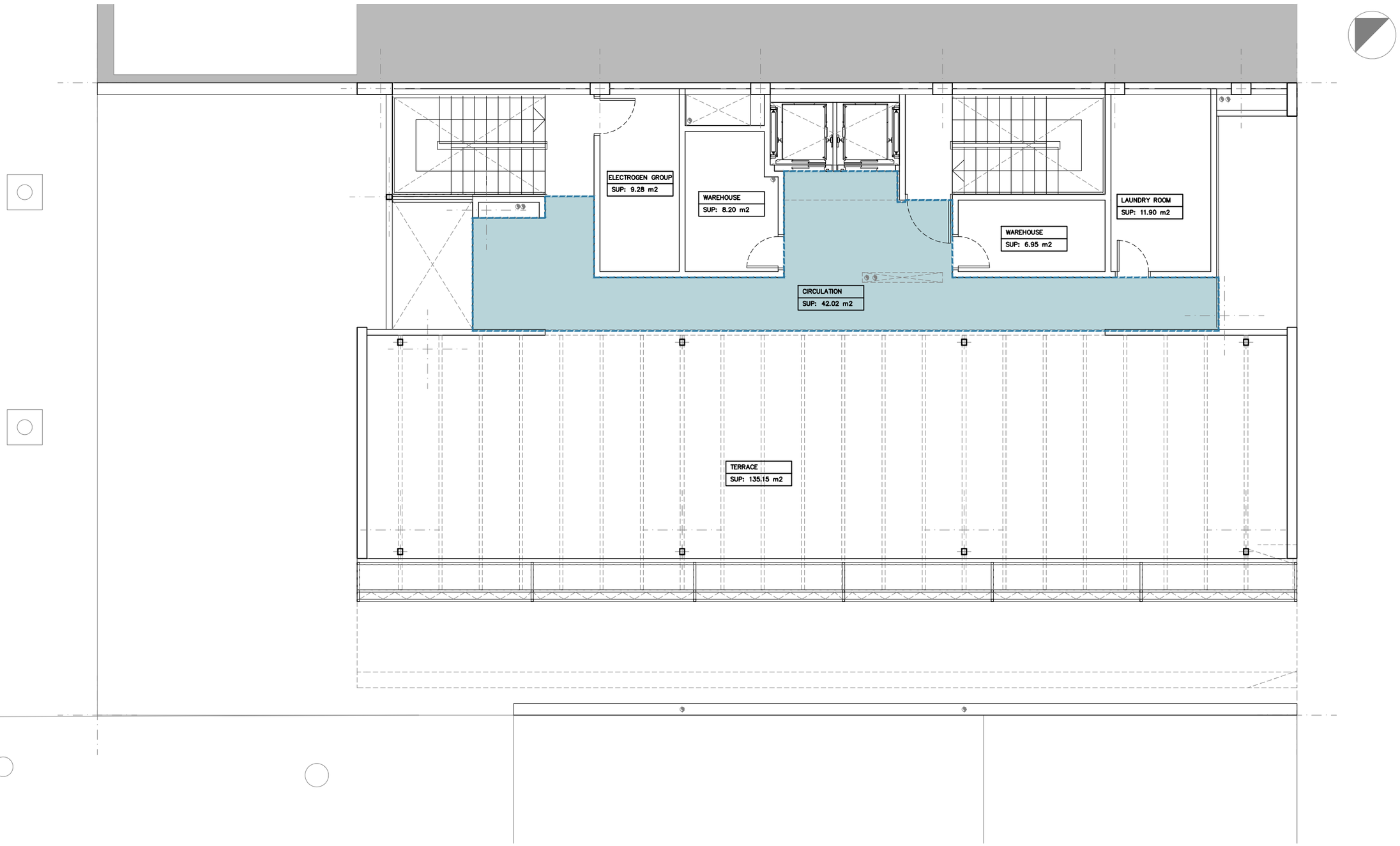
PLAN:

DISTRIBUTION AND SURFACES
FLOORS 4 AND 5

AUTHOR:

ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/50 A3: 1/100	FEBRUARY 2018	A08002-E-ARQ-03.6A.dwg	ARQ-03.6A



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PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:

DISTRIBUTION AND SURFACES
FLOOR 6

AUTHOR:

ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
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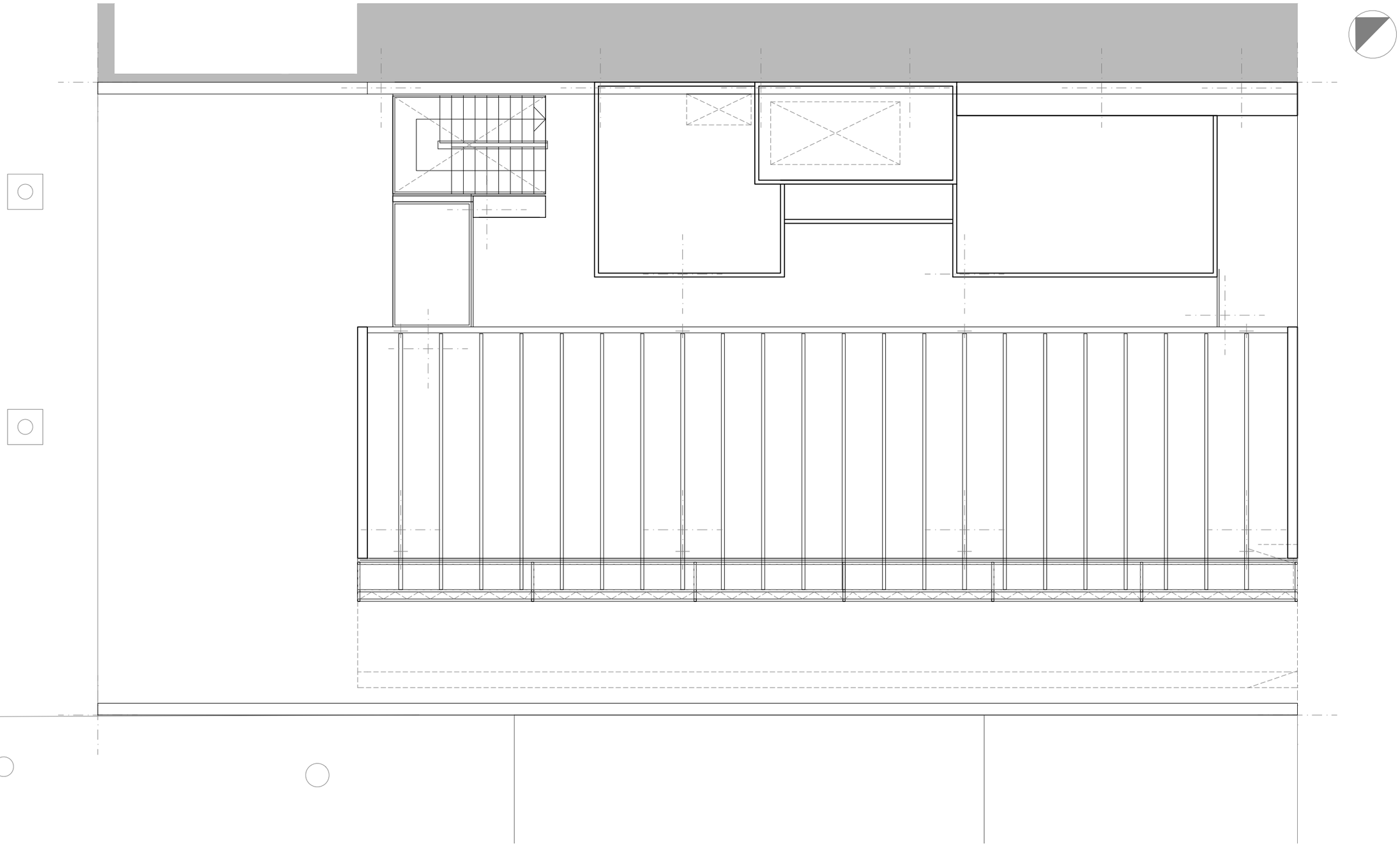

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FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:

DISTRIBUTION AND SURFACES
COVERED FLOOR

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
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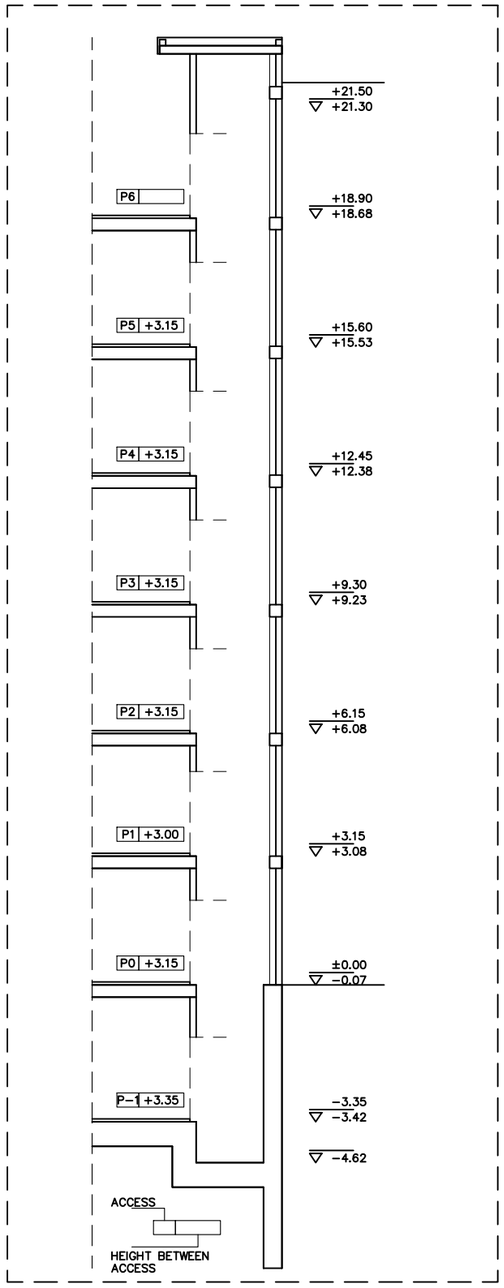
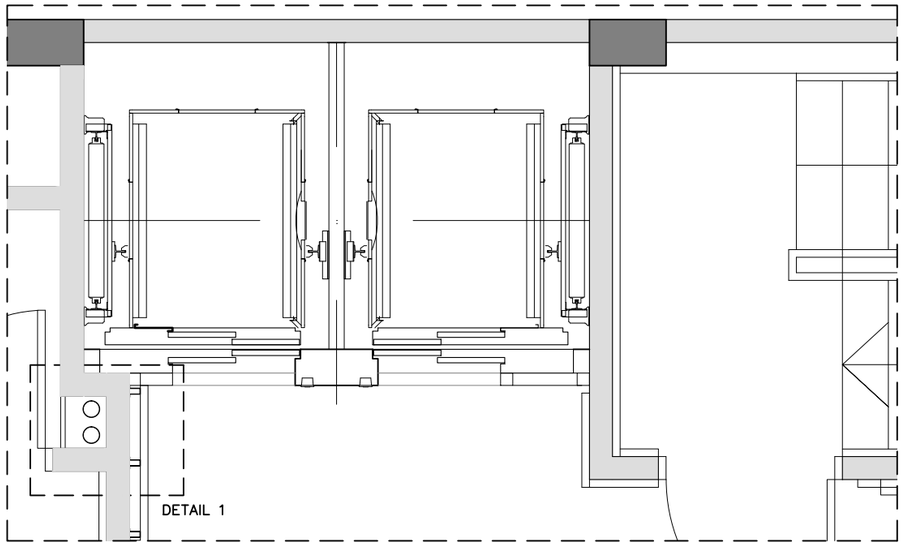
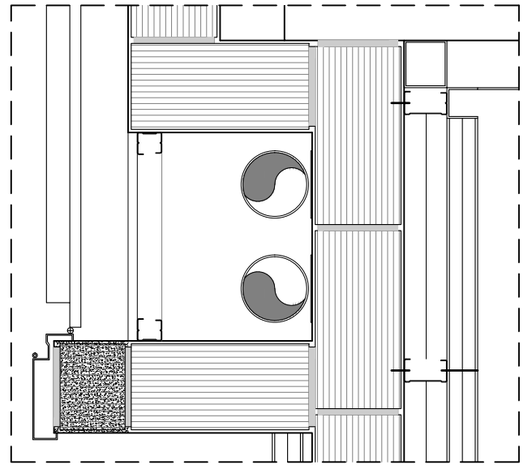


SCHEME OF STOPS
A1: S/E
A3: S/E



PLANT – ESC 1/50



DETAIL 1
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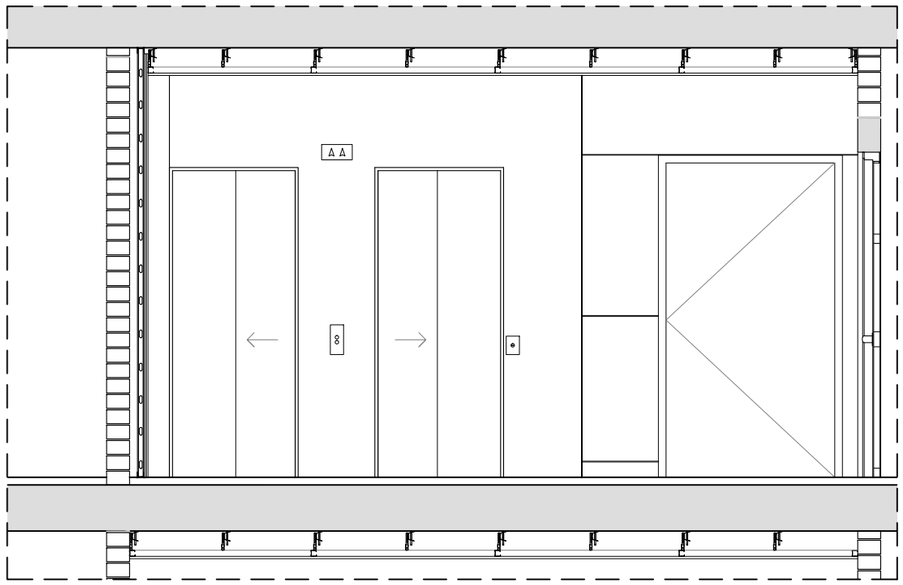
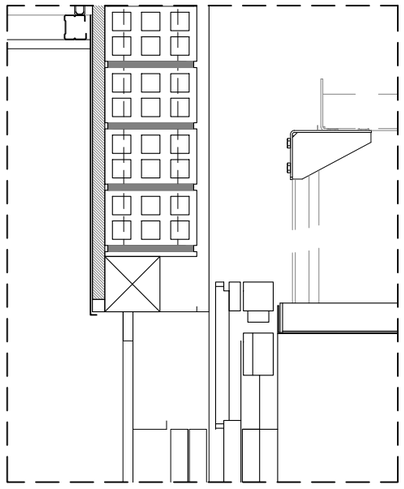
A3: 1/10



ELEVATION – ESC 1/50



DETAIL 2
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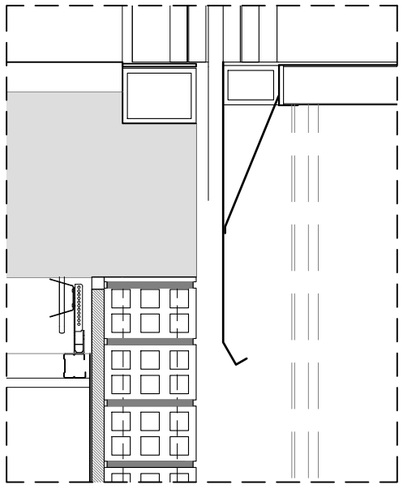
A3: 1/10



DETAIL 3
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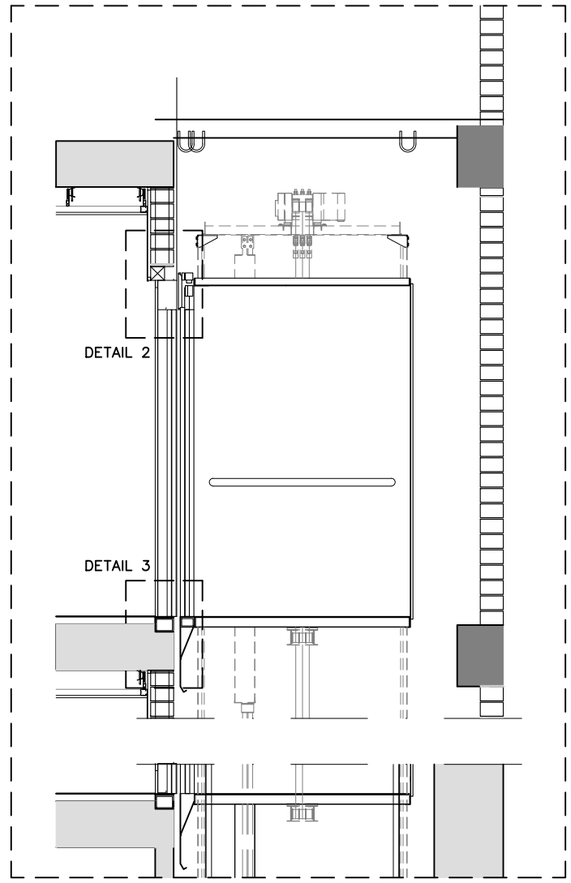
A3: 1/10



SECTION

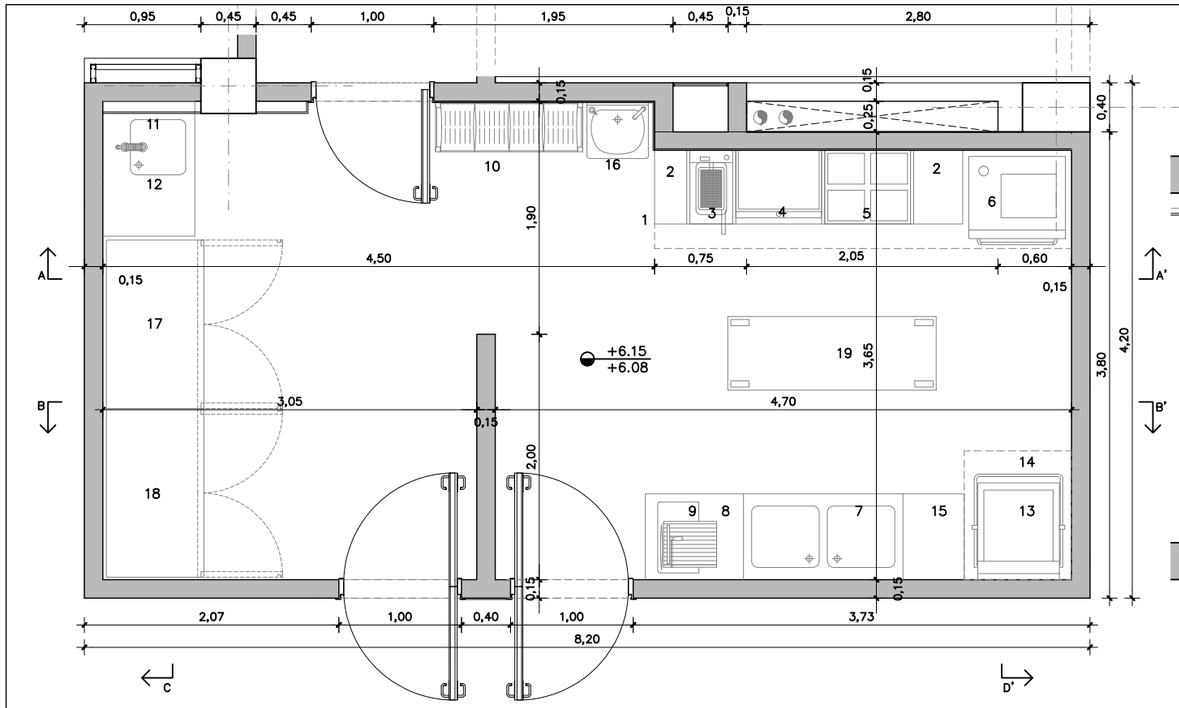
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

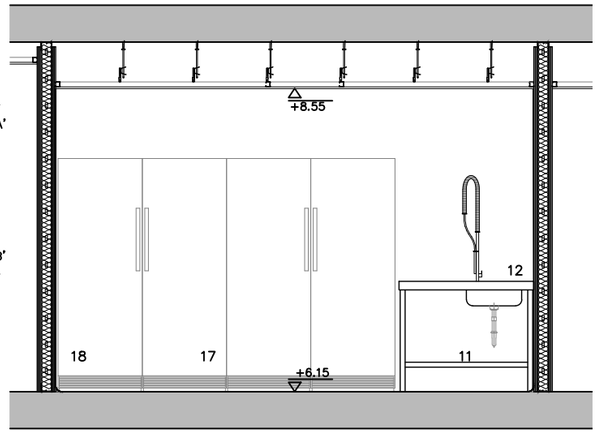
PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS AND RELATED DISABILITIES

PLAN:
EQUIPMENTS-DETAILS
ELEVATOR

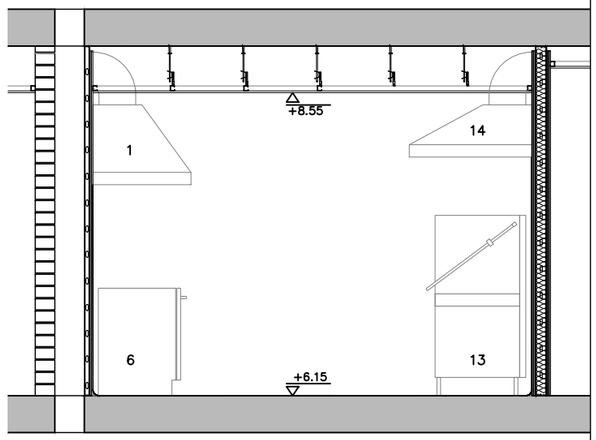
AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/25 A3: 1/50	FEBRUARY 2018	A08002-E-ARQ-04.1A.dwg	ARQ-04.1A

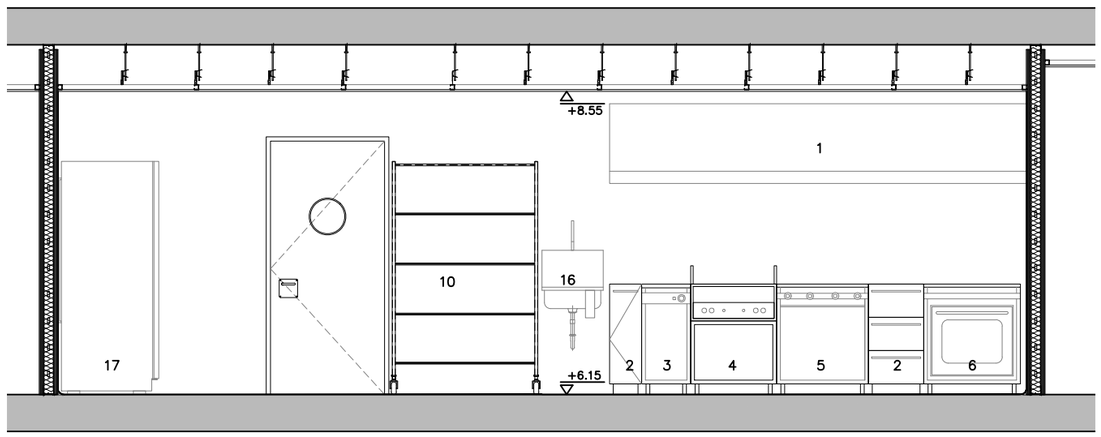




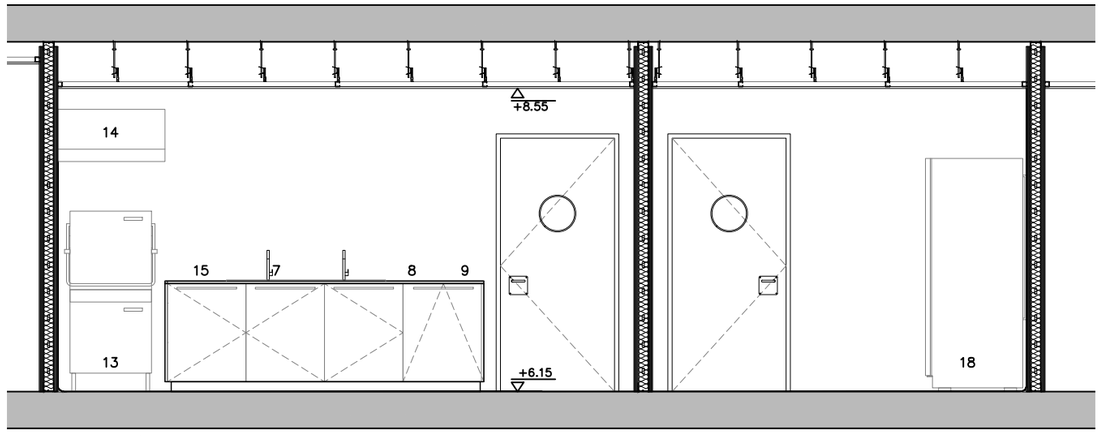
SECTION C–C'



SECTION D–D'

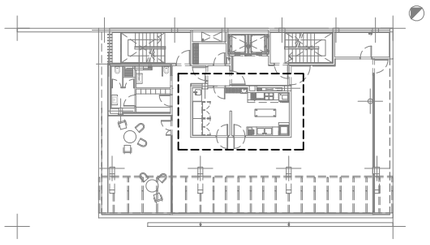


SECTION A–A'



SECTION B–B'

POSITION	UNITS	DESCRIPTION	MODEL	P(II)	P(III)
1	1	COMPENSATED MURAL HOOD	CM–80		1.2 KW
2	1	NEUTRAL ELEMENT	PL–40 + M–40		
3	2	ELECTRIC FRYER	FQE–4 1L	2.8KW	
4	1	FRY TOPELECTRIC SMOOTH	FTE–60B		0.77 KW
5	1	ELECTRIC KITCHEN 4 PLACES	PCE–60		7 KW
6	1	ELECTRIC OVEN TO CONVECTION	HACE05M		3.3 KW
7	1	MURAL TABLE	MMC–70		
8	1	MURAL TABLE	MMC–70		
9	1	LUNCH PAIL	MG–350		
10	5,6	HIGHLIGHTS OF POLYETHYLENE 4 LEVELS	EAP–40		
11	1	AUXILIAR TABLE	55074		
12	1	FAUCET shower 2 WATERS	TS–2/05		
13	1	DISHWASHER	CAP–7		1.5 KW
14	1	HOOD OF VAHOS	CV–90		
15	1	WASHING AUXILIARY TABLE OUT 1000	55071		
16	1	RENT HANDS WITH SOAP DISPENSER	LP–54–D		
17	1	POSITIVE FRIDGE CABINET	AC–700–1	1 KW	
18	1	FRIGORIFIC FRIDGE WARDER	AC–700–C	1 KW	
19	1	CENTRAL TABLE WITH WHEELS	MCR–70		



OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:

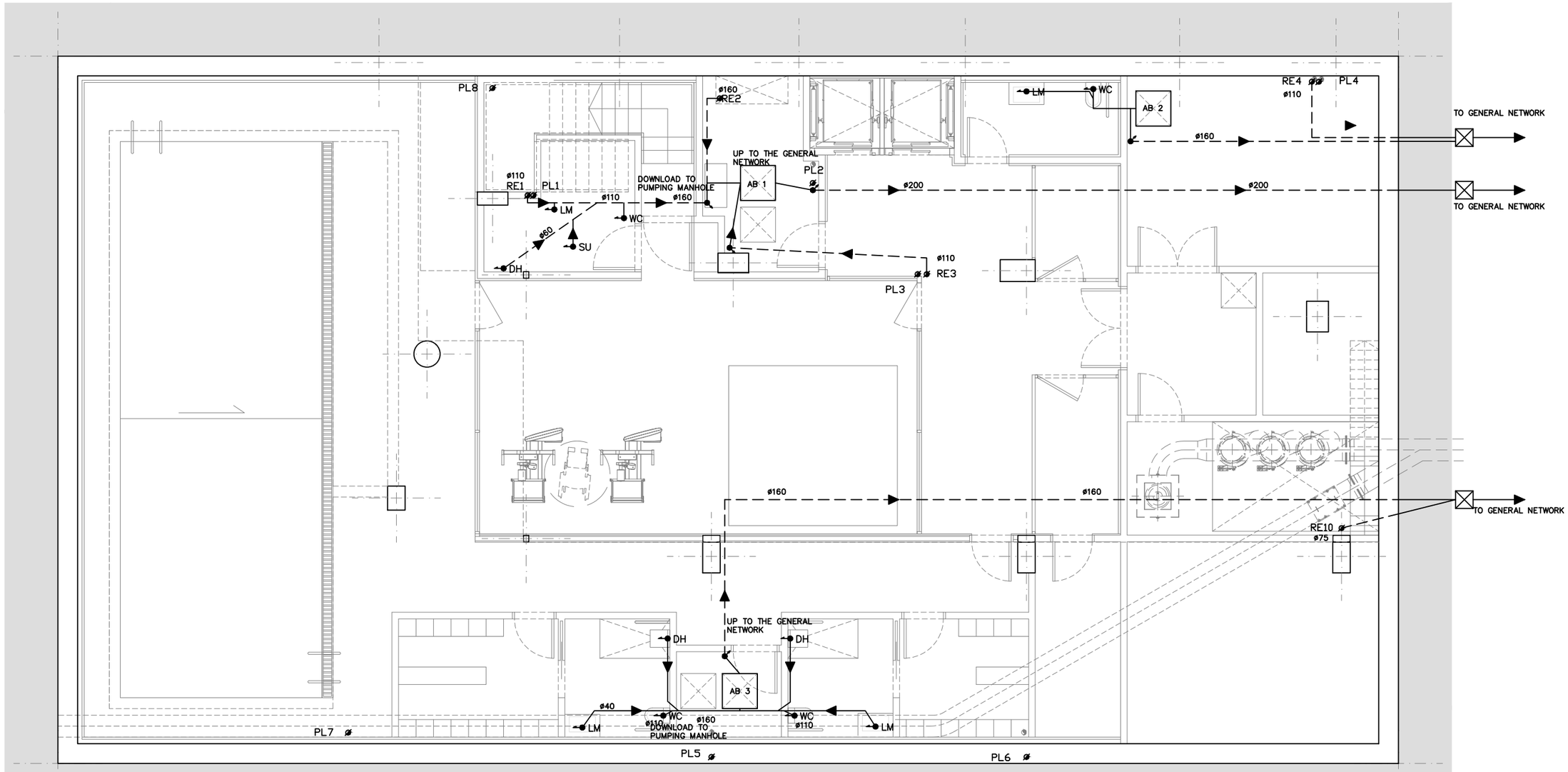
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:

EQUIPMENTS-DETAILS
KITCHEN

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/25 A3: 1/50	FEBRUARY 2018	A08002-E-ARQ-04.2A.dwg	ARQ-04.2A



DRAIN POINTS FOR SANITARY OBJECTS

WC	WATER CLOSET	4 UD.	
LM	WASHBASIN	1 UD.	
DH	SHOWER	2 UD.	
FR	KITCHEN SINK	3 UD.	
LD	WASHINGMACHINE	3 UD.	
VR	DUMP	8 UD.	
SU	SINK	1 UD.	

UD. = UNITES OF DRAIN

	BURIED DRAIN PIPE
AB	PUMPING MANHOLE
	SIFONICAN MANHOLE
	DOWN PIPE TO FOOD OF CATCH BASIN
ø	RESIDUAL DOWN PIPE

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:

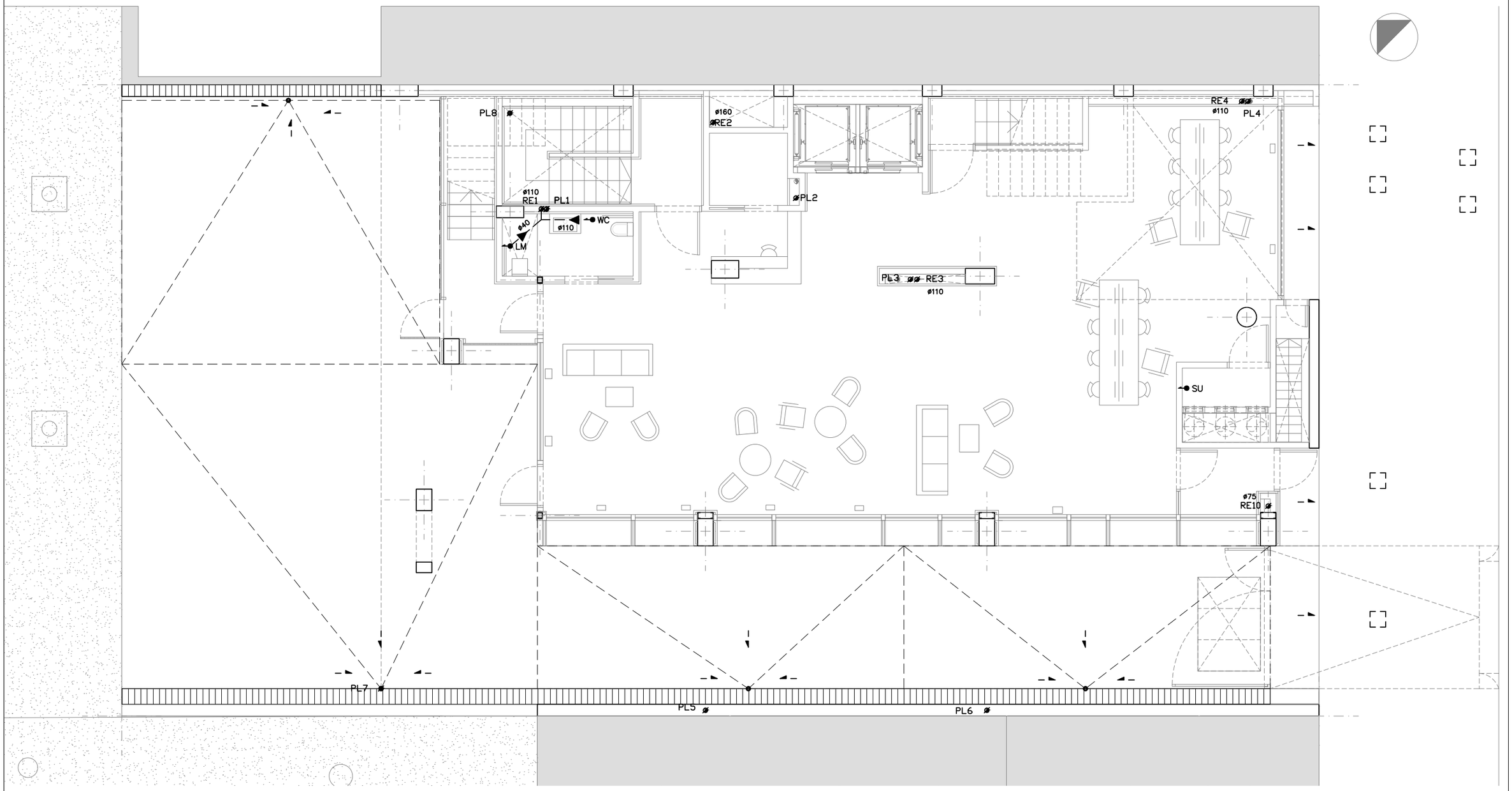
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:

SANITATION -RESIDUALS
UNDERGROUND FLOOR

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/50 A3: 1/100	FEBRUARY 2018	A08002-E-RES-01.1A.dwg	RES-01.1A



DRAIN POINTS FOR SANITARY OBJECTS

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UD. = UNITES OF DRAIN

- BURIED DRAIN PIPE
- AB PUMPING MANHOLE
- SIFONICAN MANHOLE
- DOWN PIPE TO FOOD OF CATCH BASIN
- RESIDUAL DOWN PIPE

OWNER:
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FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

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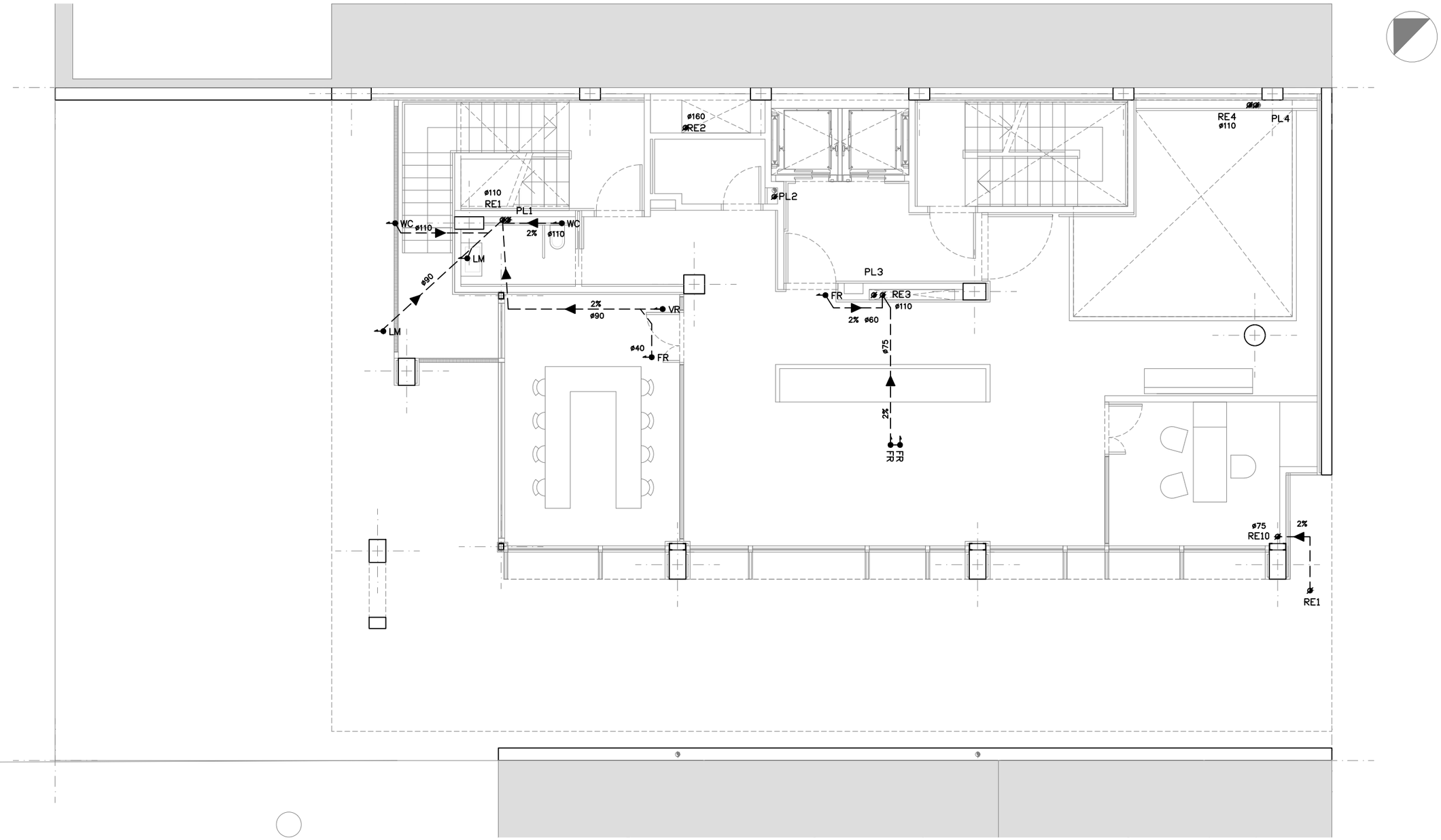
AND RELATED DISABILITIES

PLAN:
SANITATION - RESIDUALS
GROUND FLOOR

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/50 A3: 1/100	FEBRUARY 2018	A08002-E-RES-01.2A.dwg	RES-01.2A



DRAIN POINTS FOR SANITARY OBJECTS

WC	WATER CLOSET	4 UD.
LM	WASHBASIN	1 UD.
DH	SHOWER	2 UD.
FR	KITCHEN SINK	3 UD.
LD	WASHINGMACHINE	3 UD.
VR	DUMP	8 UD.
SU	SINK	1 UD.

- BURIED DRAIN PIPE
- AB — PUMPING MANHOLE
- SIFONICAN MANHOLE
- DOWN PIPE TO FOOD OF CATCH BASIN
- RESIDUAL DOWN PIPE

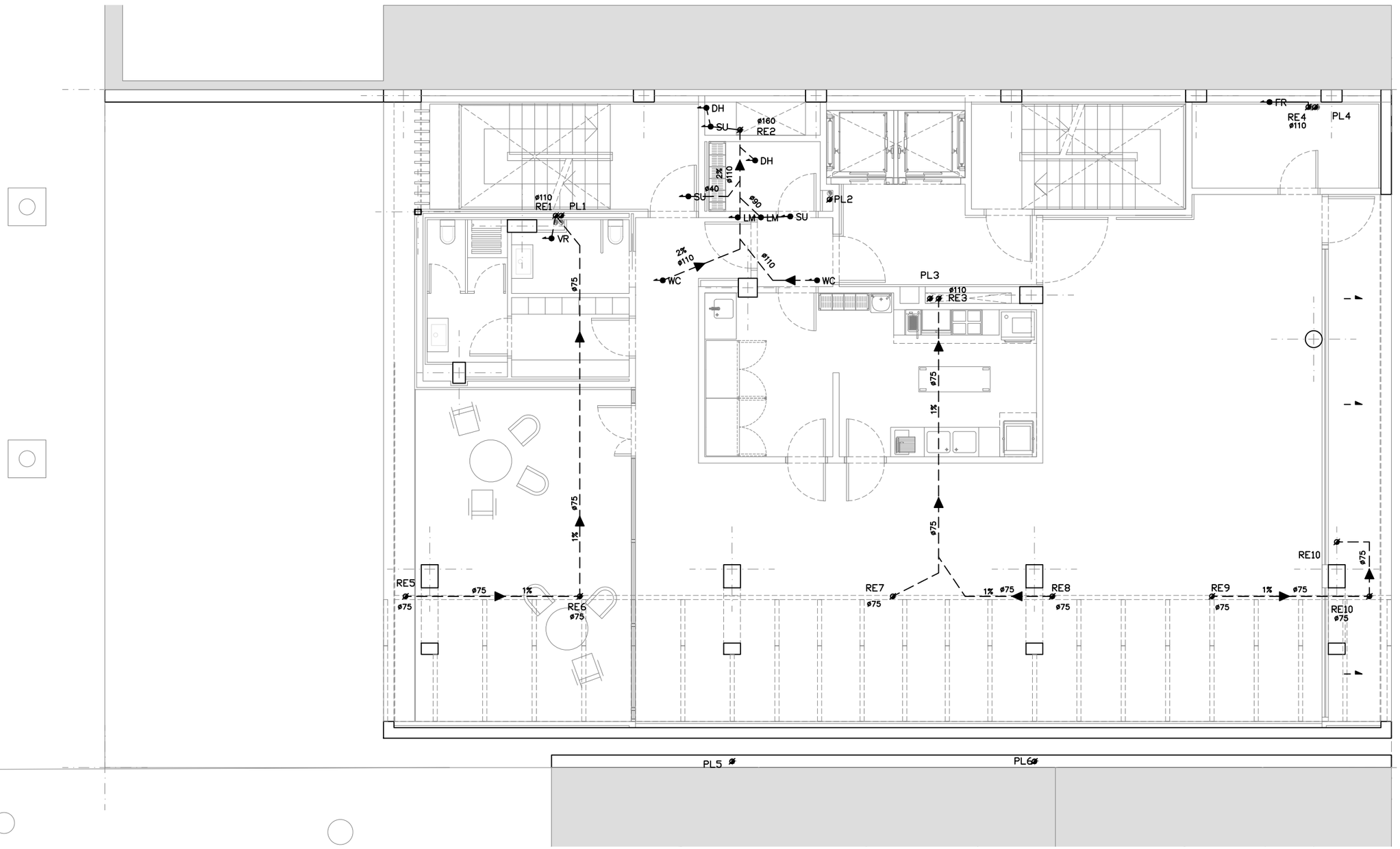
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
SANITATION - RESIDUALS
FLOOR 1

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/50 A3: 1/100	FEBRUARY 2018	A08002-E-RES-01.3A.dwg	RES-01.3A



DRAIN POINTS FOR SANITARY OBJECTS

WC	WATER CLOSET	4 UD.
LM	WASHBASIN	1 UD.
DH	SHOWER	2 UD.
FR	KITCHEN SINK	3 UD.
LD	WASHINGMACHINE	3 UD.
VR	DUMP	8 UD.
SU	SINK	1 UD.

UD. = UNITES OF DRAIN

- BURIED DRAIN PIPE
- AB — PUMPING MANHOLE
- SIFONICAN MANHOLE
- DOWN PIPE TO FOOD OF CATCH BASIN
- RESIDUAL DOWN PIPE

OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
SANITATION - RESIDUALS
FLOOR 2

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
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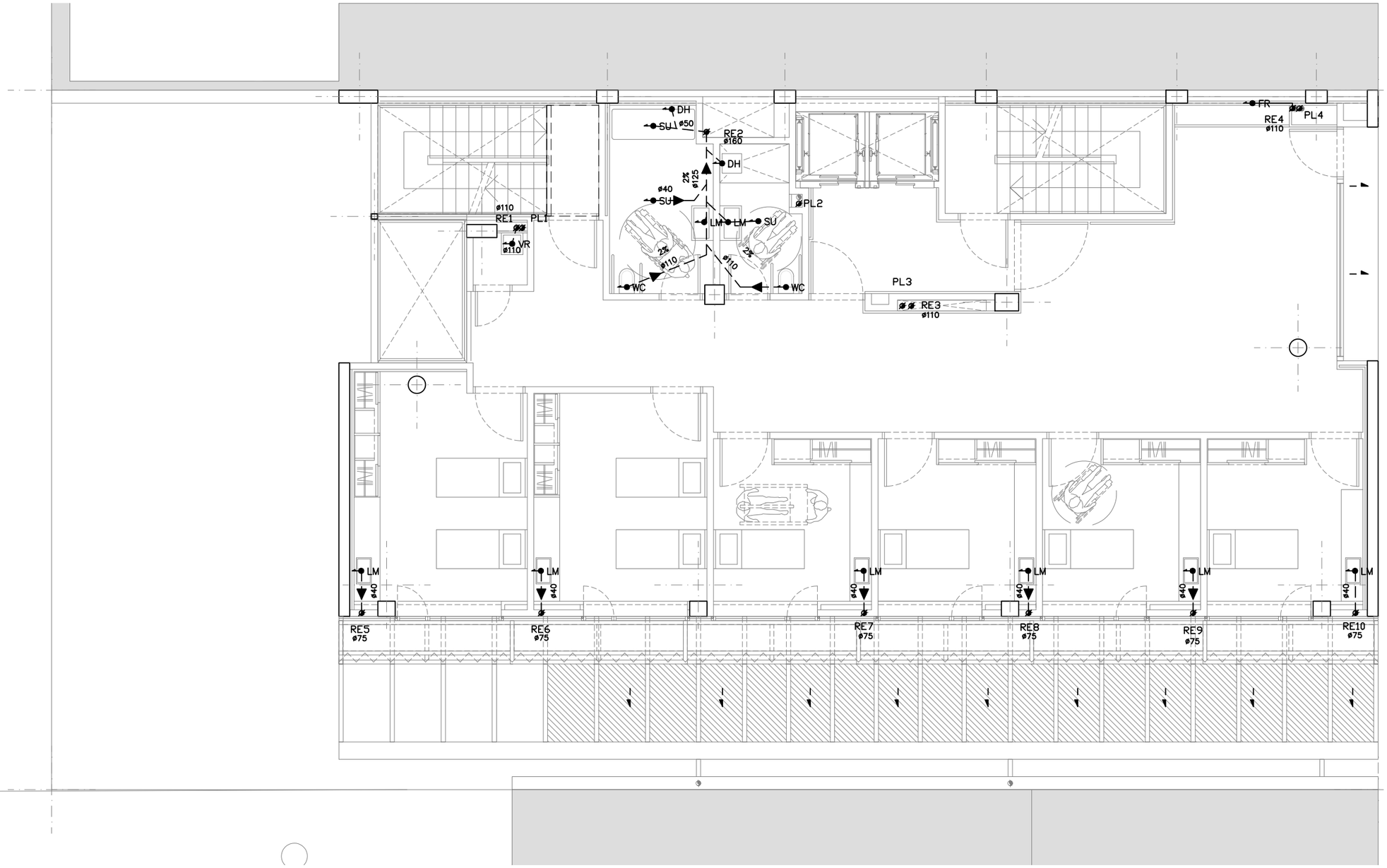


DRAIN POINTS FOR SANITARY OBJECTS

WC	WATER CLOSET	4 UD.
LM	WASHBASIN	1 UD.
DH	SHOWER	2 UD.
FR	KITCHEN SINK	3 UD.
LD	WASHINGMACHINE	3 UD.
VR	DUMP	8 UD.
SU	SINK	1 UD.

UD. = UNITES OF DRAIN

	BURIED DRAIN PIPE
AB	PUMPING MANHOLE
	SIFONICAN MANHOLE
	DOWN PIPE TO FOOD OF CATCH BASIN
ø	RESIDUAL DOWN PIPE

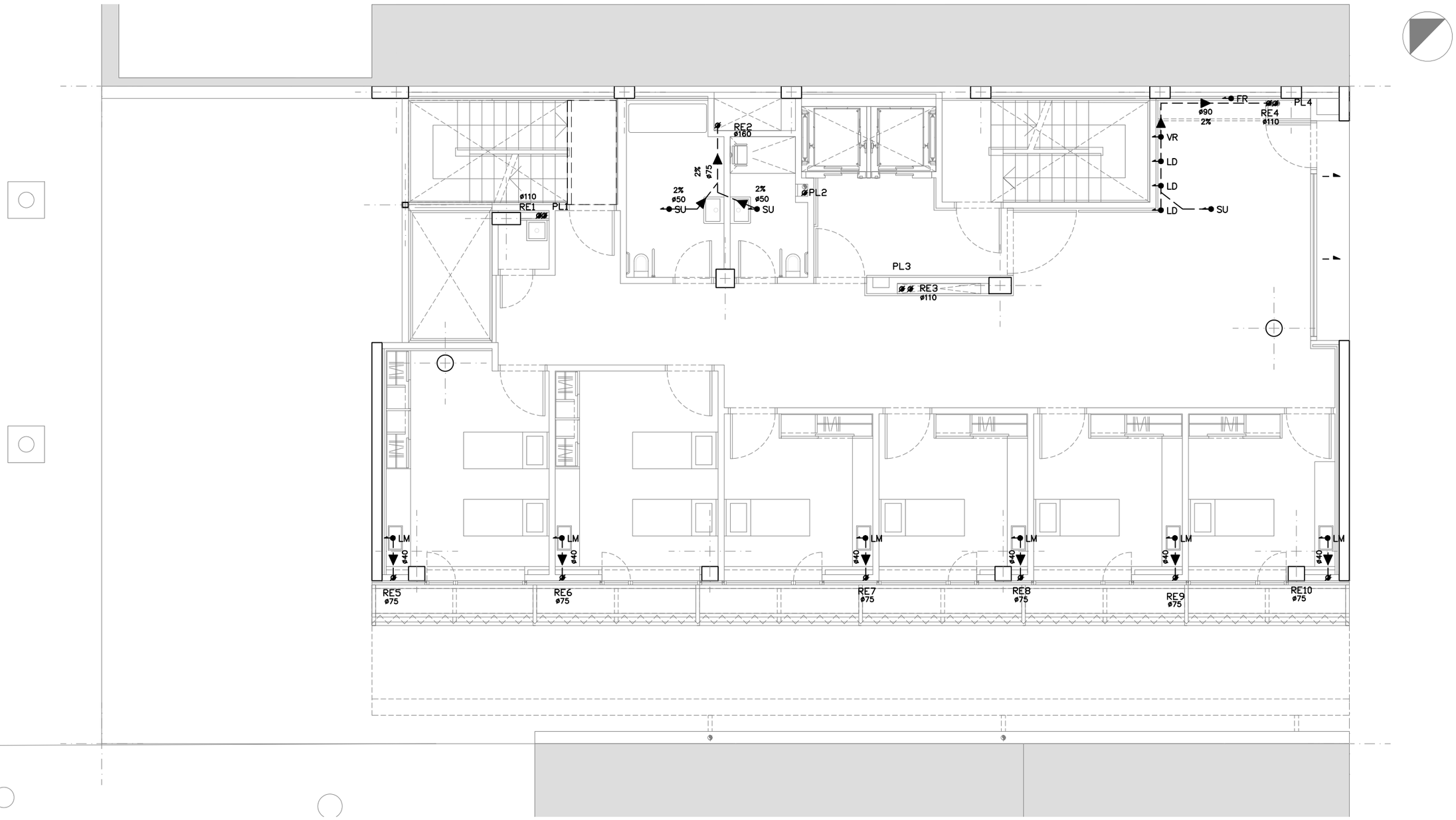
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
SANITATION - RESIDUALS
FLOOR 3

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/50 A3: 1/100	FEBRUARY 2018	A08002-E-RES-01.5A.dwg	RES-01.5A



DRAIN POINTS FOR SANITARY OBJECTS

WC	WATER CLOSET	4 UD.	
LM	WASHBASIN	1 UD.	
DH	SHOWER	2 UD.	
FR	KITCHEN SINK	3 UD.	
LD	WASHINGMACHINE	3 UD.	
VR	DUMP	8 UD.	
SU	SINK	1 UD.	

UD. = UNITES OF DRAIN

- BURIED DRAIN PIPE
- AB — PUMPING MANHOLE
- SIFONICAN MANHOLE
- DOWN PIPE TO FOOD OF CATCH BASIN
- RESIDUAL DOWN PIPE

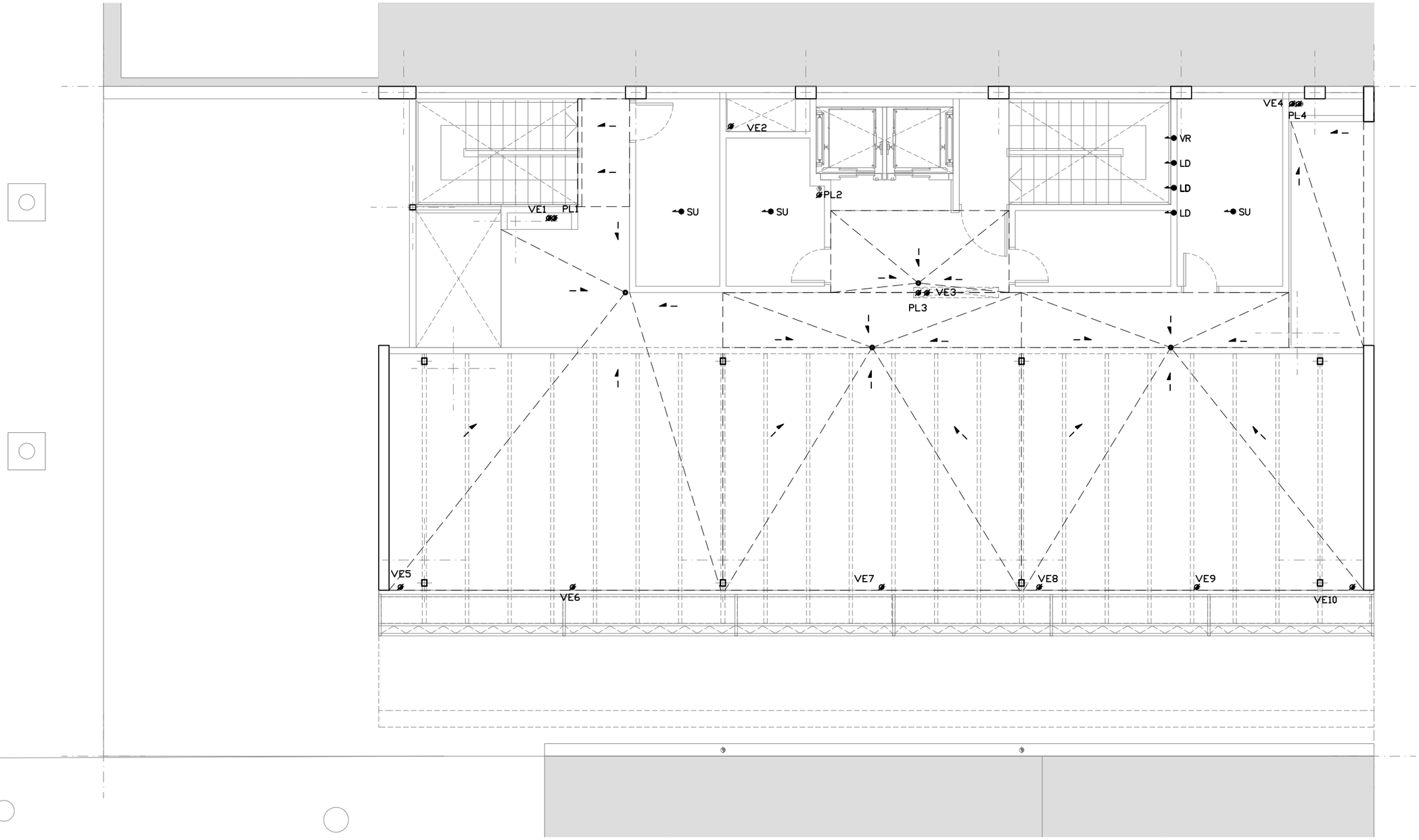
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
SANITATION - RESIDUALS
FLOORS 4 AND 5

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/50 A3: 1/100	FEBRUARY 2018	A08002-E-RES-01.6A.dwg	RES-01.6A



DRAIN POINTS FOR SANITARY OBJECTS

WC	WATER CLOSET	4 UD.
LM	WASHBASIN	1 UD.
DH	SHOWER	2 UD.
FR	KITCHEN SINK	3 UD.
LD	WASHINGMACHINE	3 UD.
VR	DUMP	8 UD.
SU	SINK	1 UD.

UD. = UNITES OF DRAIN

BURIED DRAIN PIPE

PUMPING MANHOLE

SIFONICAN MANHOLE

DOWN PIPE TO FOOD OF CATCH BASIN

RESIDUAL DOWN PIPE

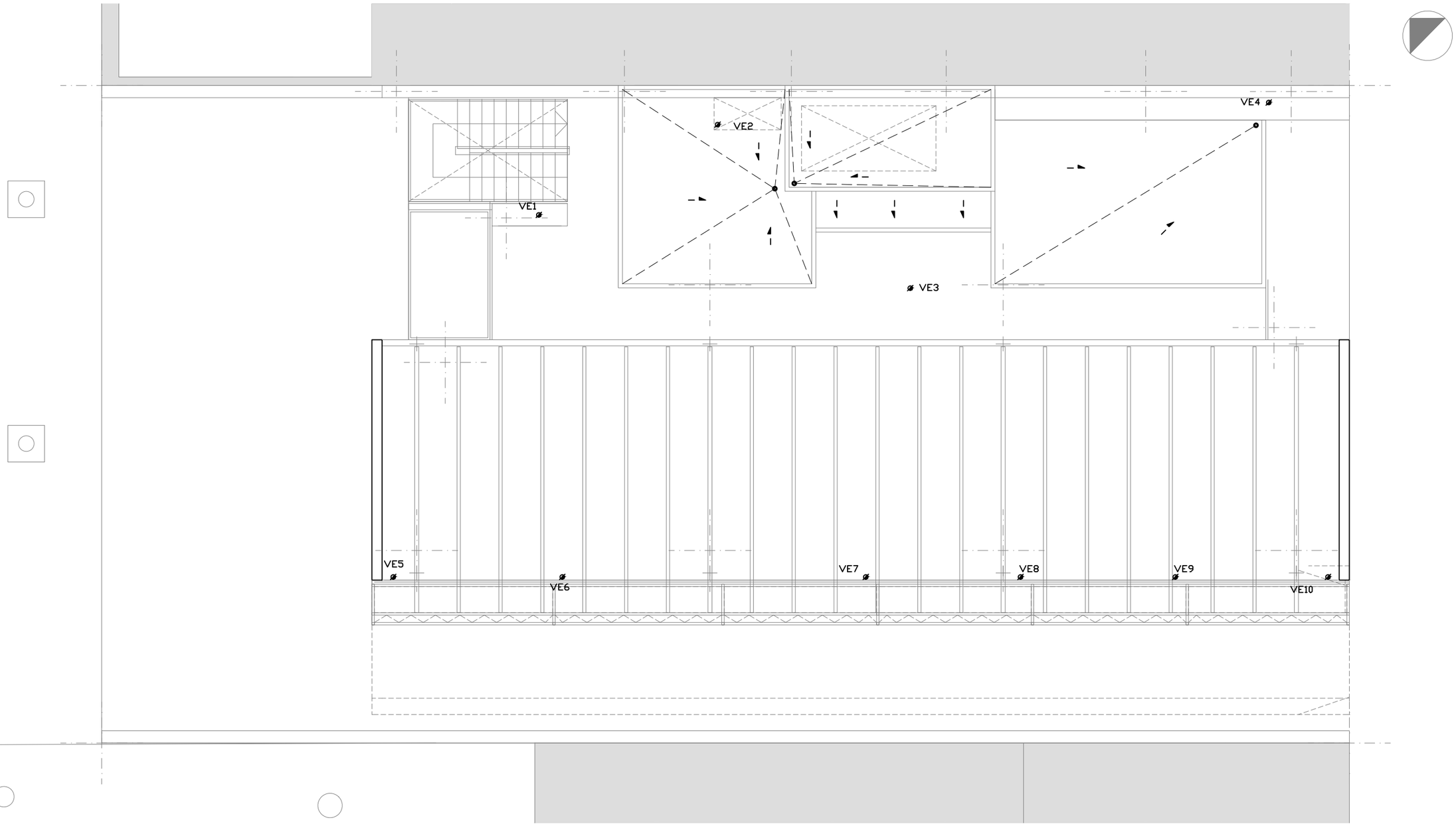
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS AND RELATED DISABILITIES

PLAN:
SANITATION - RESIDUALS
FLOOR 6

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/50 A3: 1/100	FEBRUARY 2018	A08002-E-RES-01.7A.dwg	RES-01.7A



DRAIN POINTS FOR SANITARY OBJECTS

WC	WATER CLOSET	4 UD.
LM	WASHBASIN	1 UD.
DH	SHOWER	2 UD.
FR	KITCHEN SINK	3 UD.
LD	WASHINGMACHINE	3 UD.
VR	DUMP	8 UD.
SU	SINK	1 UD.

UD. = UNITES OF DRAIN

- BURIED DRAIN PIPE
- AB PUMPING MANHOLE
- SIFONICAN MANHOLE
- DOWN PIPE TO FOOD OF CATCH BASIN
- RESIDUAL DOWN PIPE

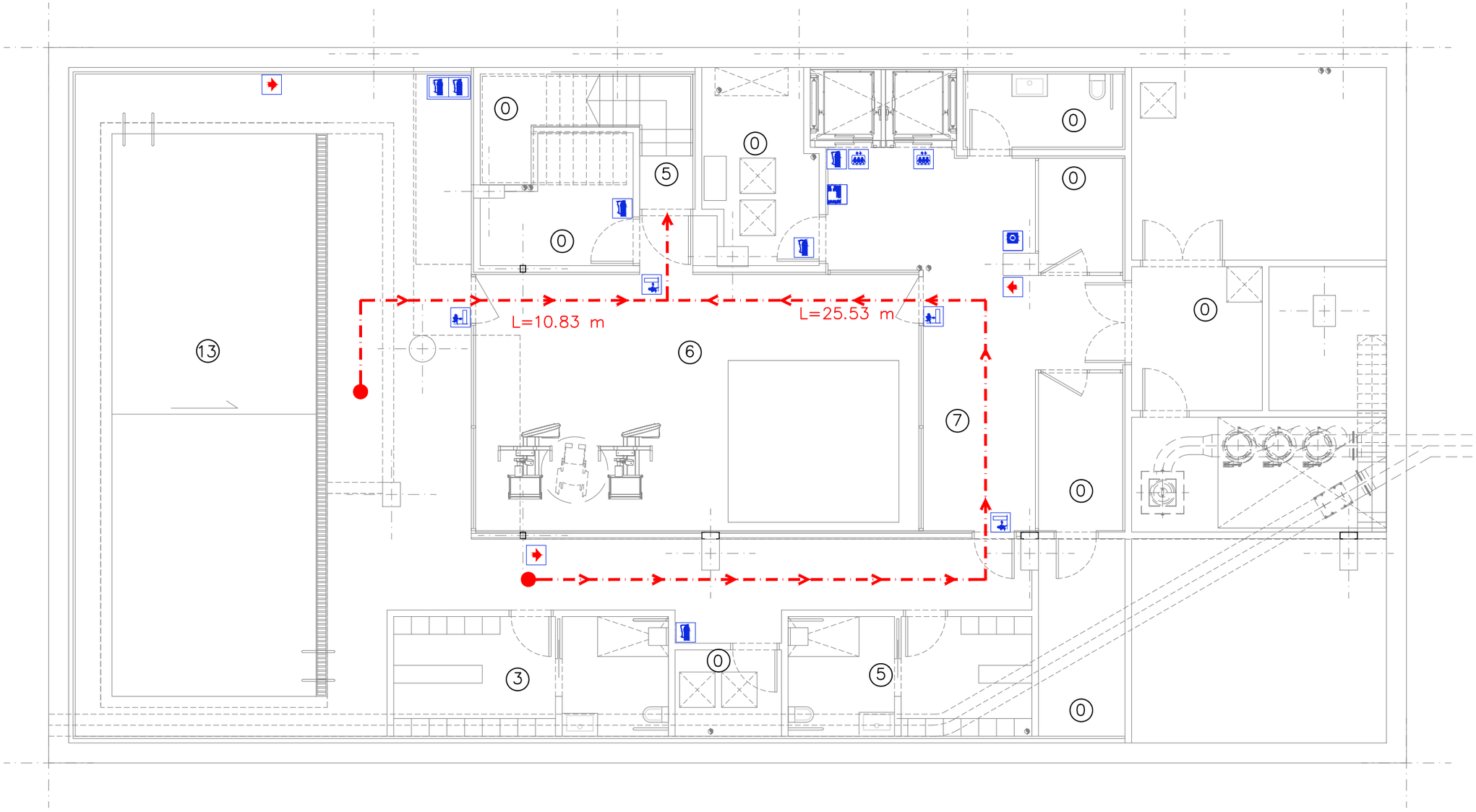
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
SANITATION - RESIDUALS
COVERED FLOOR

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/50 A3: 1/100	FEBRUARY 2018	A08002-E-RES-01.8A.dwg	RES-01.8A



LEGEND	
ROUTE OF EVAQUATION AND DISTANCE	NOT PASS
EVACUATION DIRECTION	EMERGENCY ELEVATOR
EVACUATION ORIGIN	EXTINGUISHER
OCCUPATION	ALARM BUTTON
NOT EMERGENCY EXIT	MOUTH OF FIRE
EMERGENCY EXIT	EVACUATION ROUTE

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:

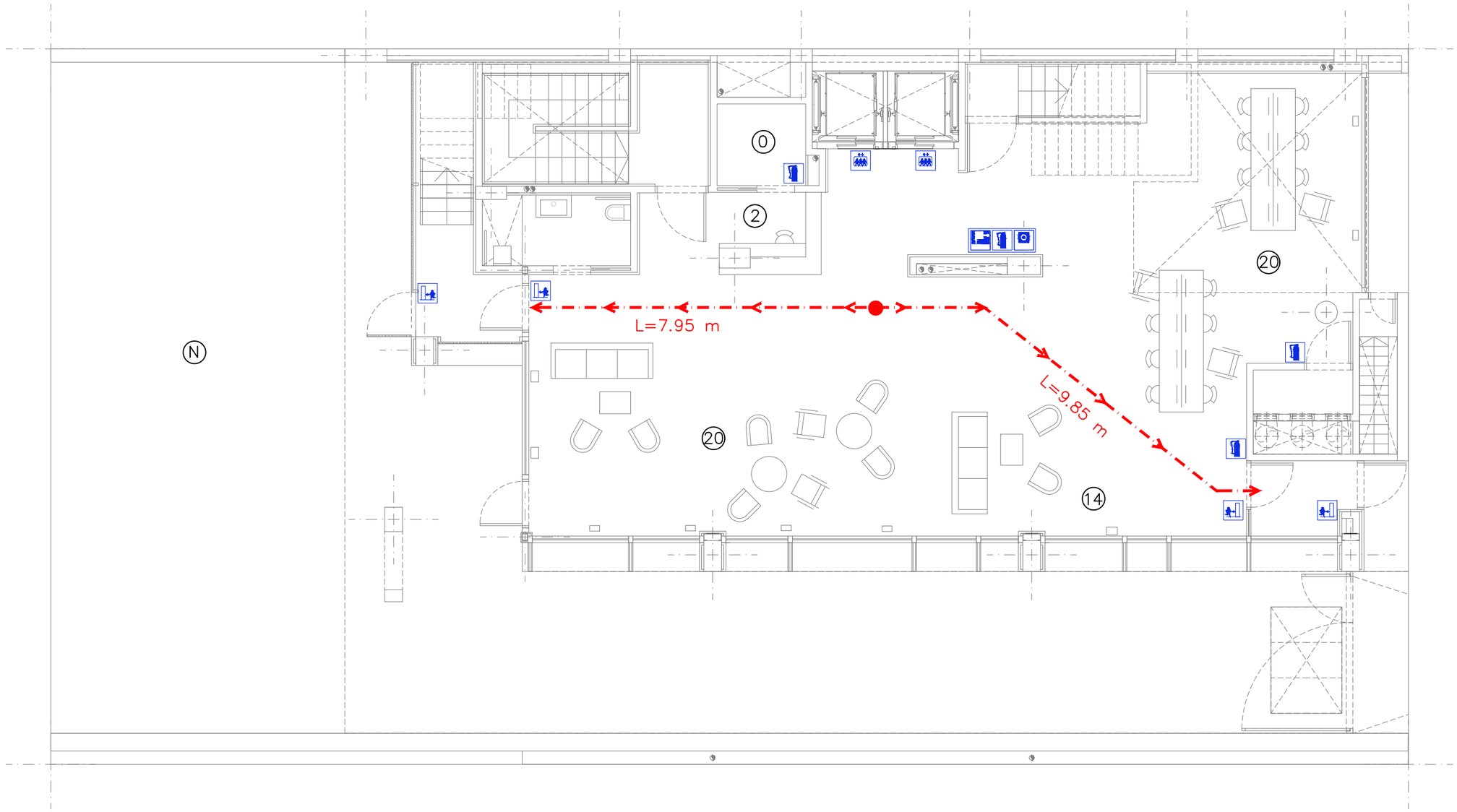
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:

EVACUATION AND SIGNALING
UNDERGROUND FLOOR

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-EVC-01.1A.dwg	EVC-01.1A



LEGEND	
ROUTE OF EVAQUATION AND DISTANCE	NOT PASS
EVACUATION DIRECTION	EMERGENCY ELEVATOR
EVACUATION ORIGIN	EXTINGUISHER
OCCUPATION	ALARM BUTTON
NOT EMERGENCY EXIT	MOUTH OF FIRE
EMERGENCY EXIT	EVACUATION ROUTE

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:

EVACUATION AND SIGNALING
GROUND FLOOR

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
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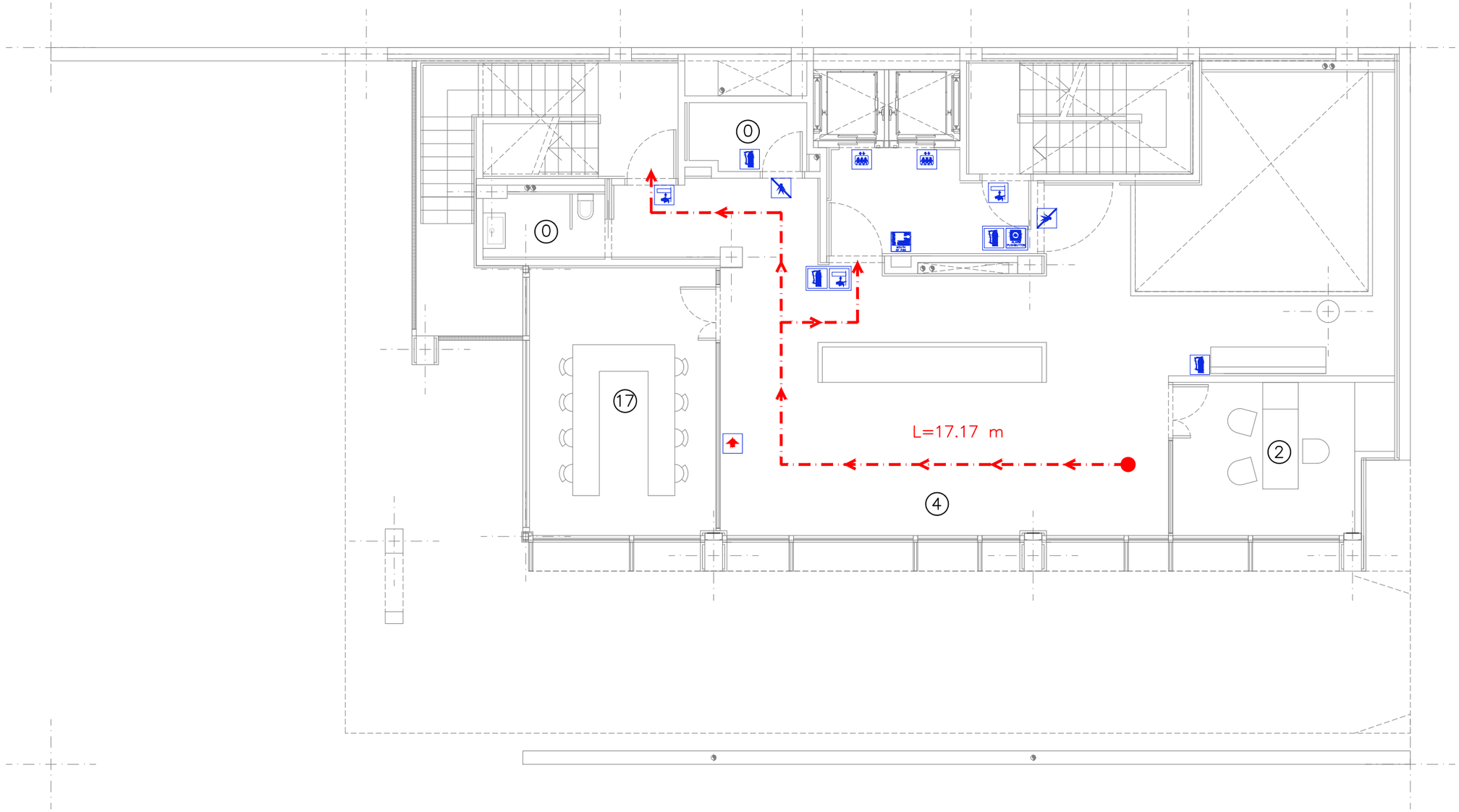


LEGEND	
ROUTE OF EVAQUATION AND DISTANCE	NOT PASS
EVACUATION DIRECTION	EMERGENCY ELEVATOR
EVACUATION ORIGIN	EXTINGUISHER
OCCUPATION	ALARM BUTTON
NOT EMERGENCY EXIT	MOUTH OF FIRE
EMERGENCY EXIT	EVACUATION ROUTE

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

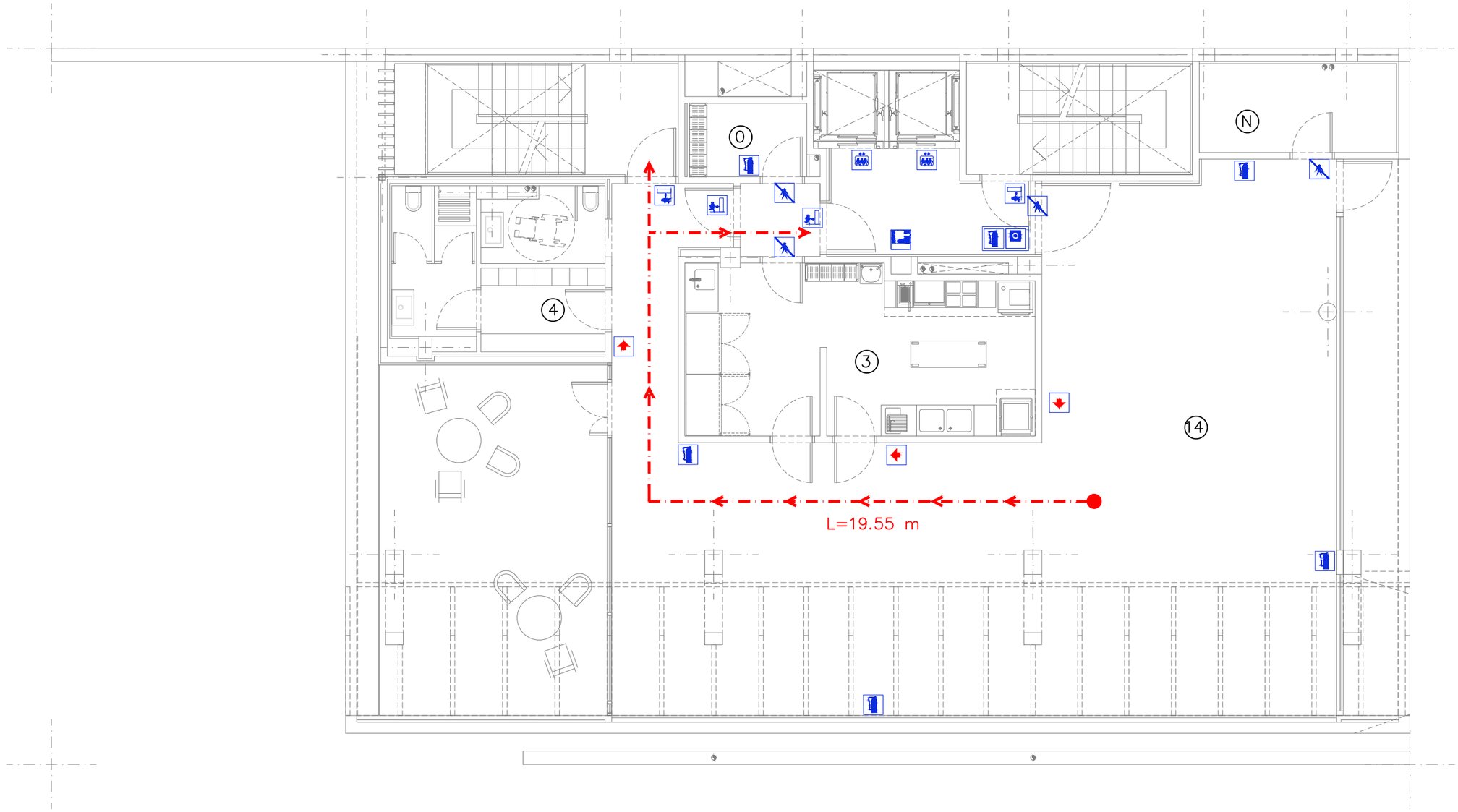
PLAN:

EVACUATION AND SIGNALING
FLOOR 1

AUTHOR:

ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-EVC-01.3A.dwg	EVC-01.3A



LEGEND	
ROUTE OF EVAQUATION AND DISTANCE	NOT PASS
EVACUATION DIRECTION	EMERGENCY ELEVATOR
EVACUATION ORIGIN	EXTINGUISHER
OCCUPATION	ALARM BUTTON
NOT EMERGENCY EXIT	MOUTH OF FIRE
EMERGENCY EXIT	EVACUATION ROUTE

OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
EVACUATION AND SIGNALING
FLOOR 2

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
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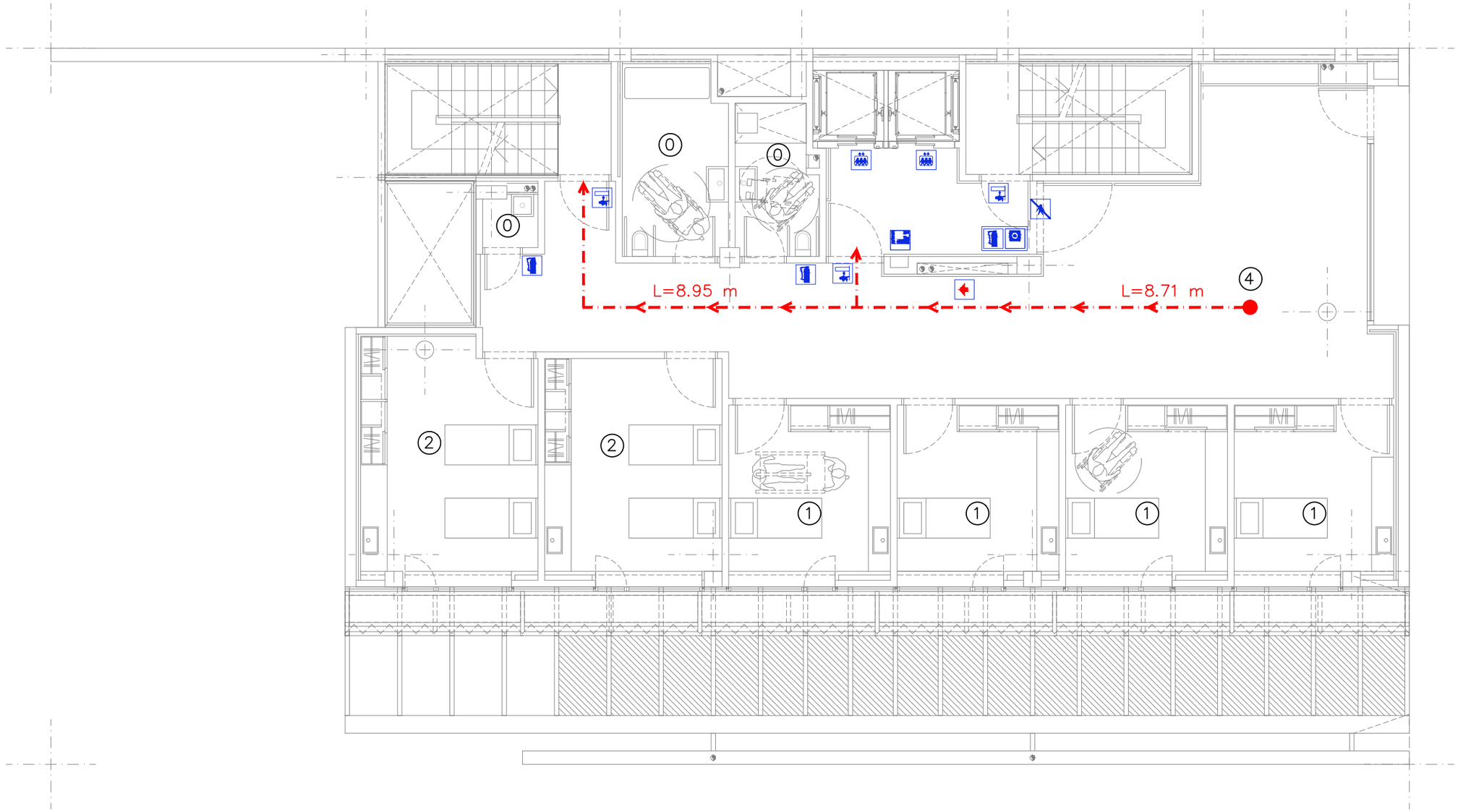

LEGEND	
ROUTE OF EVAQUATION AND DISTANCE	NOT PASS
EVACUATION DIRECTION	EMERGENCY ELEVATOR
EVACUATION ORIGIN	EXTINGUISHER
OCCUPATION	ALARM BUTTON
NOT EMERGENCY EXIT	MOUTH OF FIRE
EMERGENCY EXIT	EVACUATION ROUTE

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RAČUNALNIŠTVO IN INFORMATIKO

PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:

EVACUATION AND SIGNALING
FLOOR 3

AUTHOR:

ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-EVC-01.5A.dwg	EVC-01.5A

LEGEND	
ROUTE OF EVAQUATION AND DISTANCE	NOT PASS
EVACUATION DIRECTION	EMERGENCY ELEVATOR
EVACUATION ORIGIN	EXTINGUISHER
OCCUPATION	ALARM BUTTON
NOT EMERGENCY EXIT	MOUTH OF FIRE
EMERGENCY EXIT	EVACUATION ROUTE

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
EVACUATION AND SIGNALING
FLOOR 4 AND 5

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
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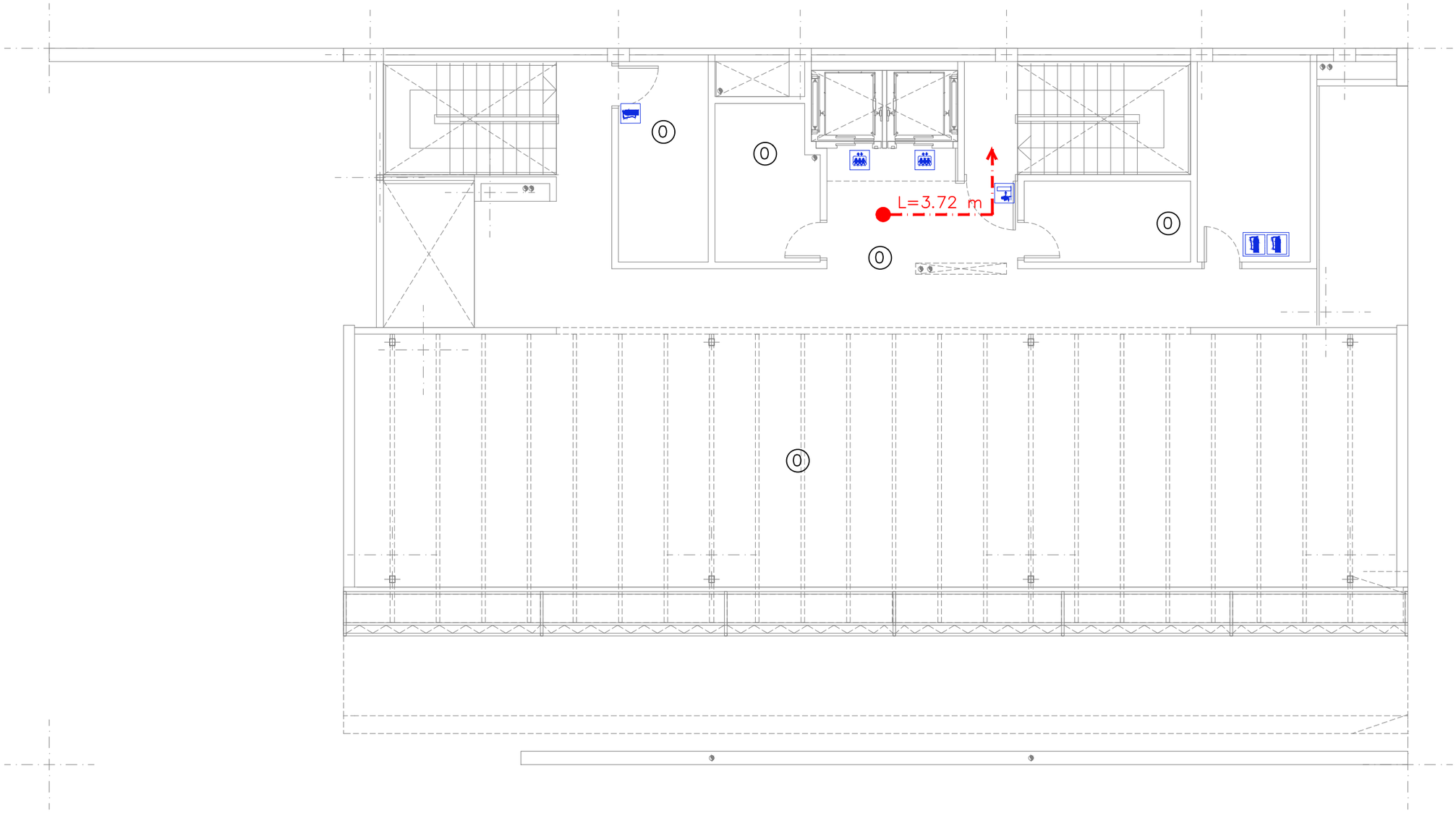


LEGEND	
ROUTE OF EVAQUATION AND DISTANCE	NOT PASS
EVACUATION DIRECTION	EMERGENCY ELEVATOR
EVACUATION ORIGIN	EXTINGUISHER
OCCUPATION	ALARM BUTTON
NOT EMERGENCY EXIT	MOUTH OF FIRE
EMERGENCY EXIT	EVACUATION ROUTE

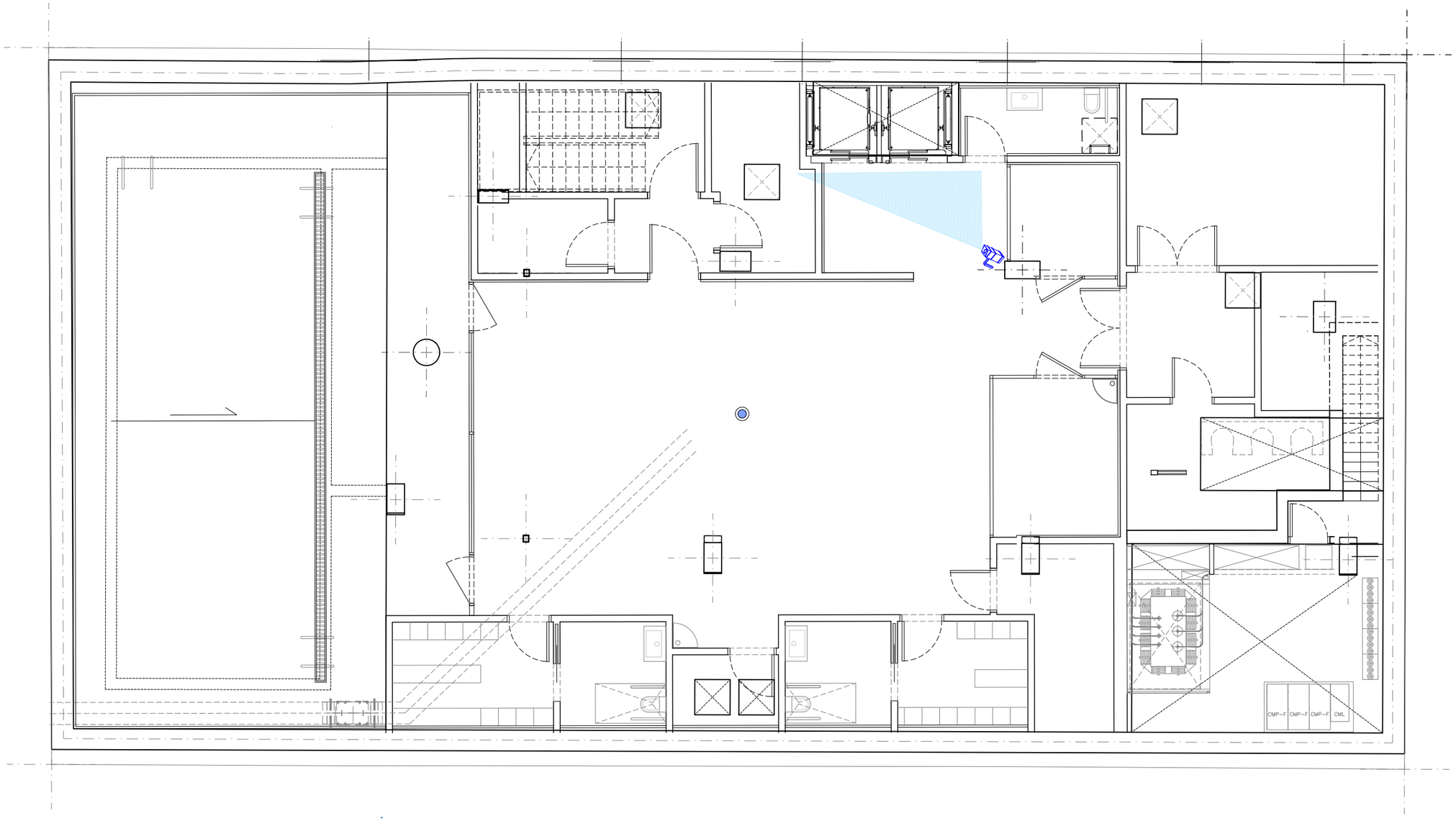
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
EVACUATION AND SIGNALING
FLOOR 6

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-EVC-01.7A.dwg	EVC-01.7A



LEGEND			
	MINIDOMO INTERIOR	V	VIDEO RECORDER=4U
	MINIDOMO EXTERIOR		LECTOR
	FIXED CAMERA		ROOM TIMER
	VARIFOCAL CAMERA TO EXTERIOR	P	OPENING PUSHBUTTON
	COMPUTER TO CONTROL		CCTV CAMERA VISION FIELD

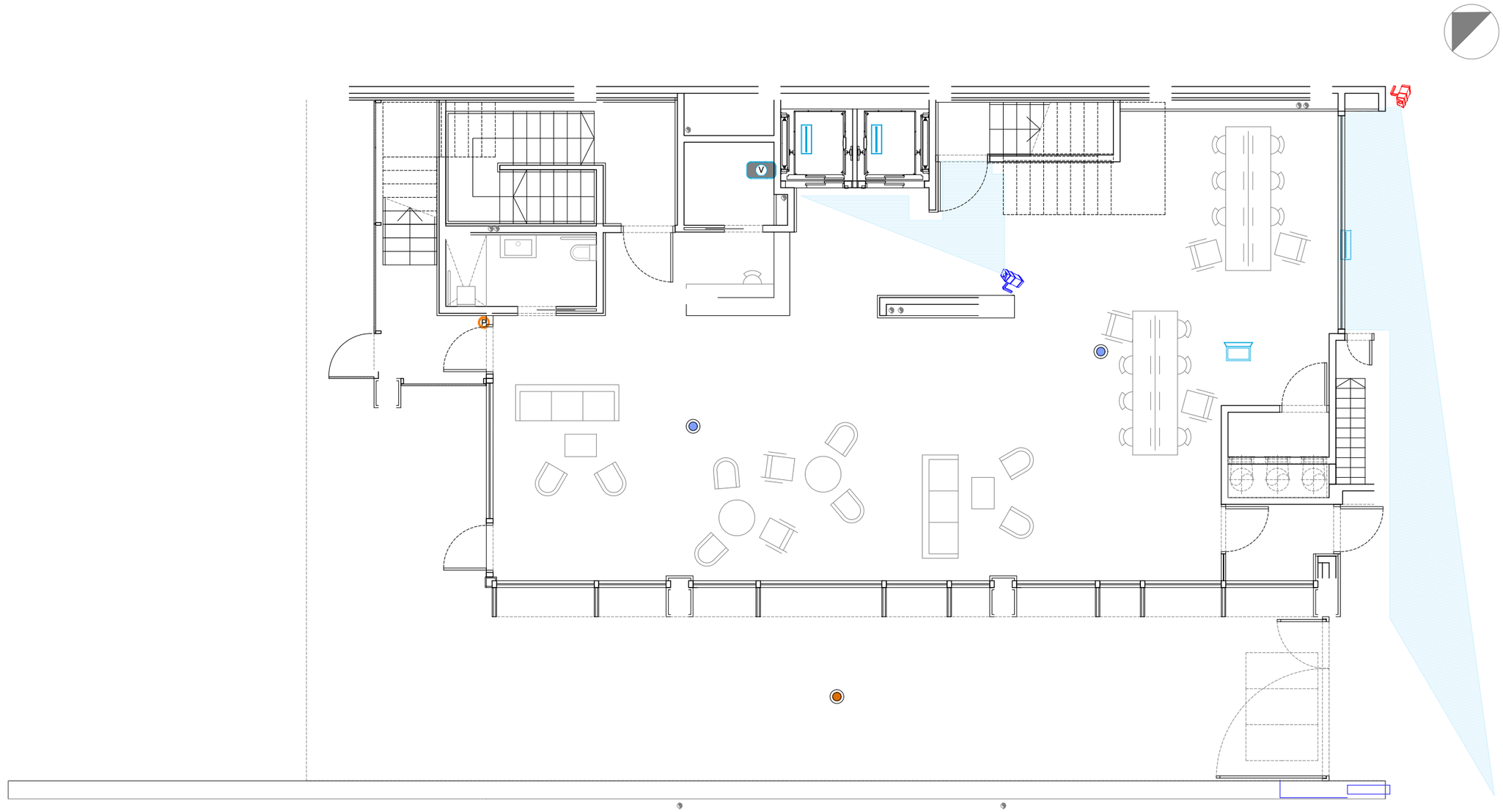
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS AND RELATED DISABILITIES

PLAN:
CCTV INSTALLATIONS
UNDERGROUND FLOOR

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	CCA-01.1A.dwg	CCA-01.1A



LEGEND			
	MINIDOMO INTERIOR	V	VIDEO RECORDER=4U
	MINIDOMO EXTERIOR		LECTOR
	FIXED CAMERA		ROOM TIMER
	VARIFOCAL CAMERA TO EXTERIOR	P	OPENING PUSHBUTTON
	COMPUTER TO CONTROL		CCTV CAMERA VISION FIELD

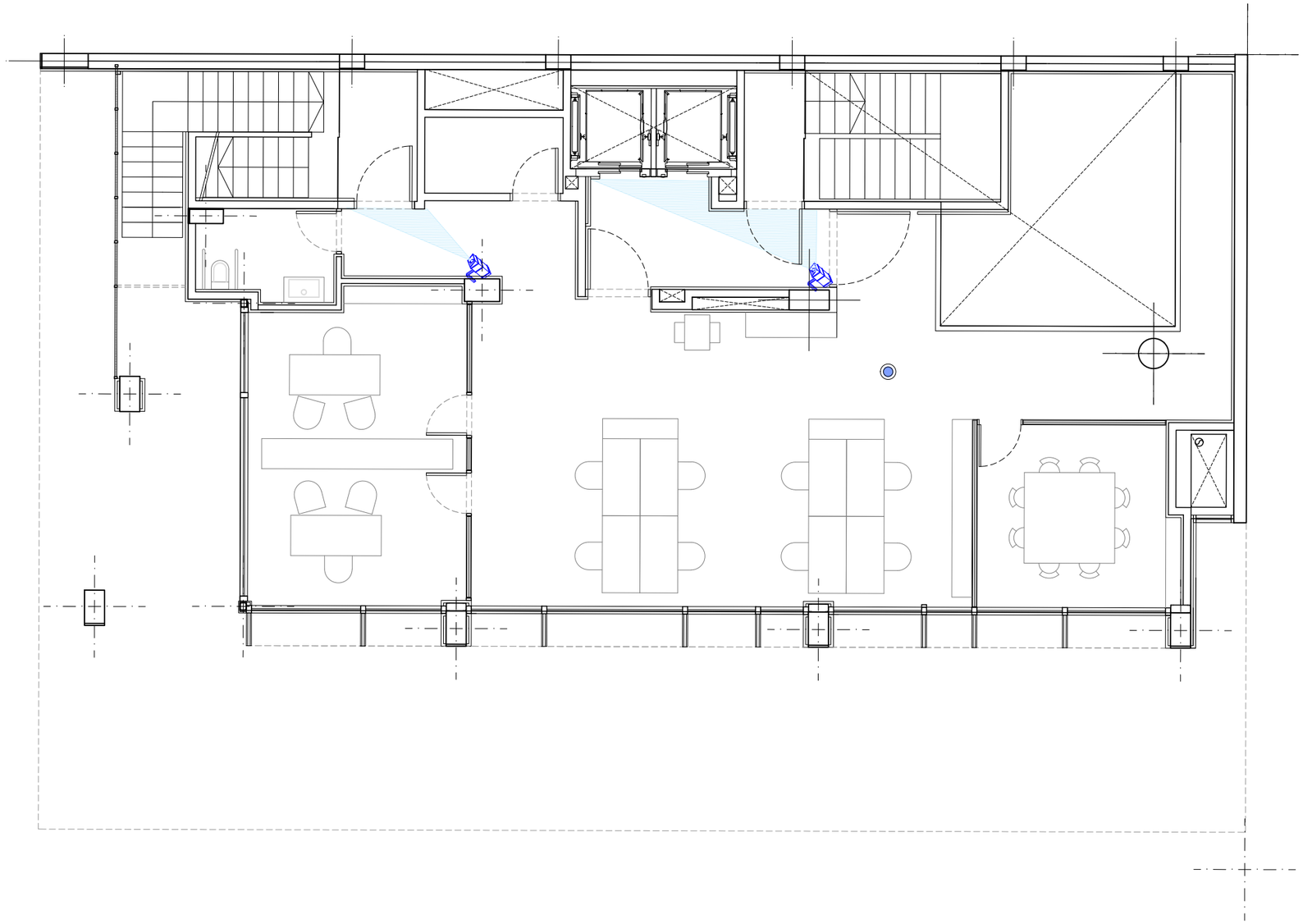
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RAČUNALNIŠTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
CCTV INSTALLATIONS
GROUND FLOOR

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-CCA-01.2A.dwg	CCA-01.2A



LEGEND			
	MINIDOMO INTERIOR	V	VIDEO RECORDER=4U
	MINIDOMO EXTERIOR		LECTOR
	FIXED CAMERA		ROOM TIMER
	VARIFOCAL CAMERA TO EXTERIOR	P	OPENING PUSHBUTTON
	COMPUTER TO CONTROL		CCTV CAMERA VISION FIELD

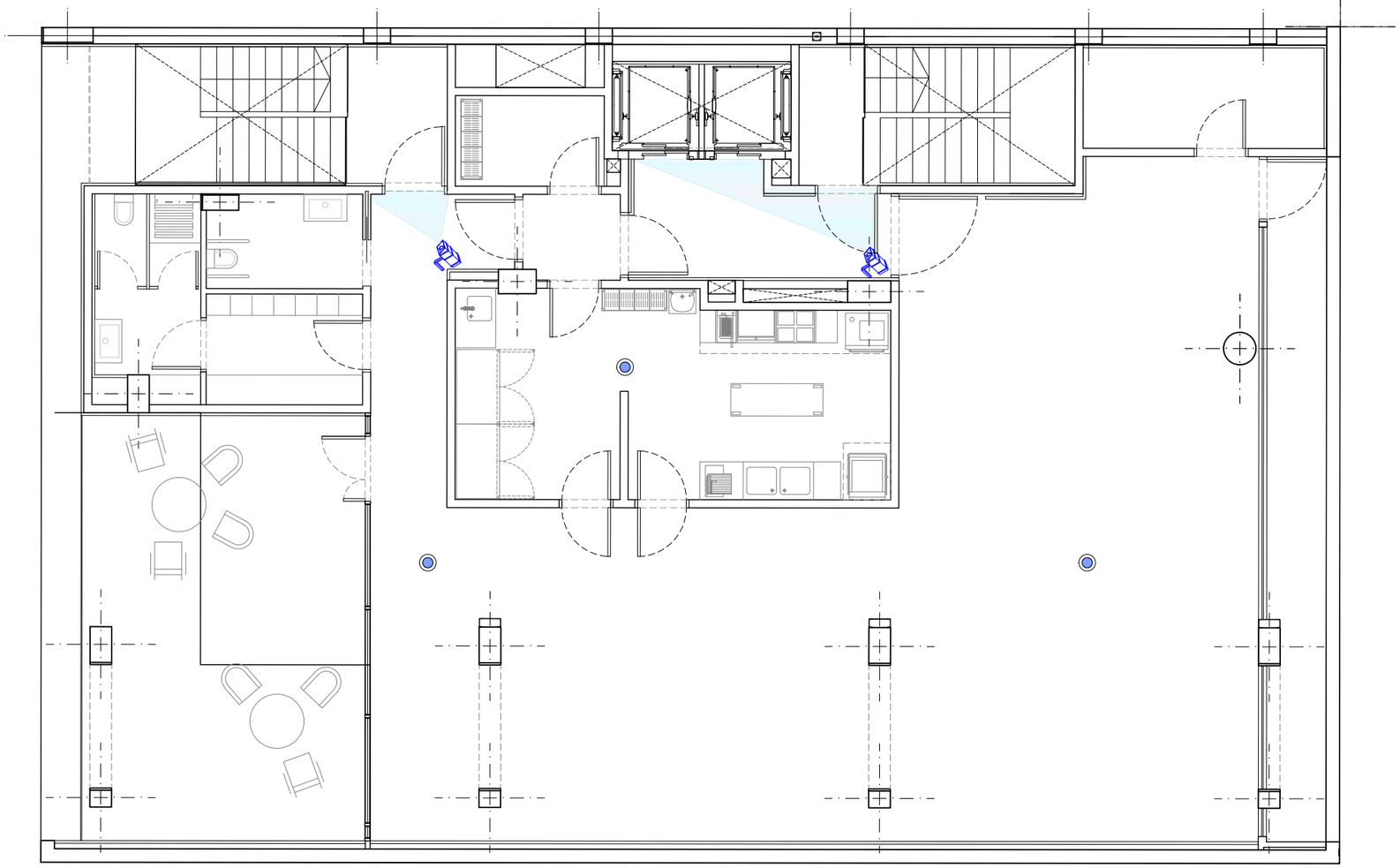
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
CCTV INSTALLATIONS
FLOOR 1

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-CCA-01.3A.dwg	CCA-01.3A



LEGEND			
	MINIDOMO INTERIOR	V	VIDEO RECORDER=4U
	MINIDOMO EXTERIOR		LECTOR
	FIXED CAMERA		ROOM TIMER
	VARIFOCAL CAMERA TO EXTERIOR	P	OPENING PUSHBUTTON
	COMPUTER TO CONTROL		CCTV CAMERA VISION FIELD

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RAČUNALNIŠTVO IN INFORMATIKO

PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

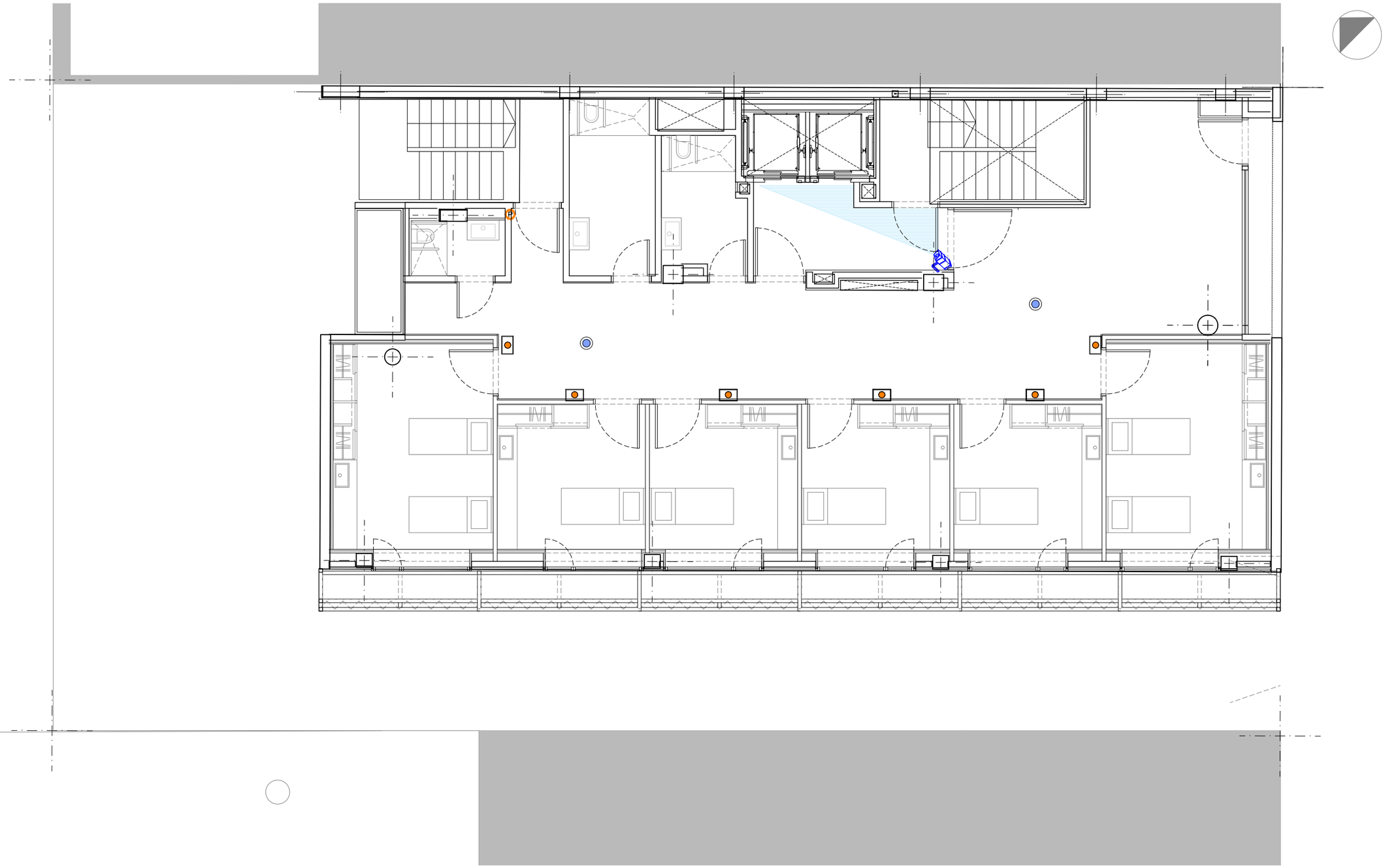
PLAN:

CCTV INSTALLATIONS
FLOOR 2

AUTHOR:

ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-CCA-01.4A.dwg	CCA-01.4A



LEGEND			
	MINIDOMO INTERIOR	V	VIDEO RECORDER=4U
	MINIDOMO EXTERIOR		LECTOR
	FIXED CAMERA		ROOM TIMER
	VARIFOCAL CAMERA TO EXTERIOR	P	OPENING PUSHBUTTON
	COMPUTER TO CONTROL		CCTV CAMERA VISION FIELD

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:

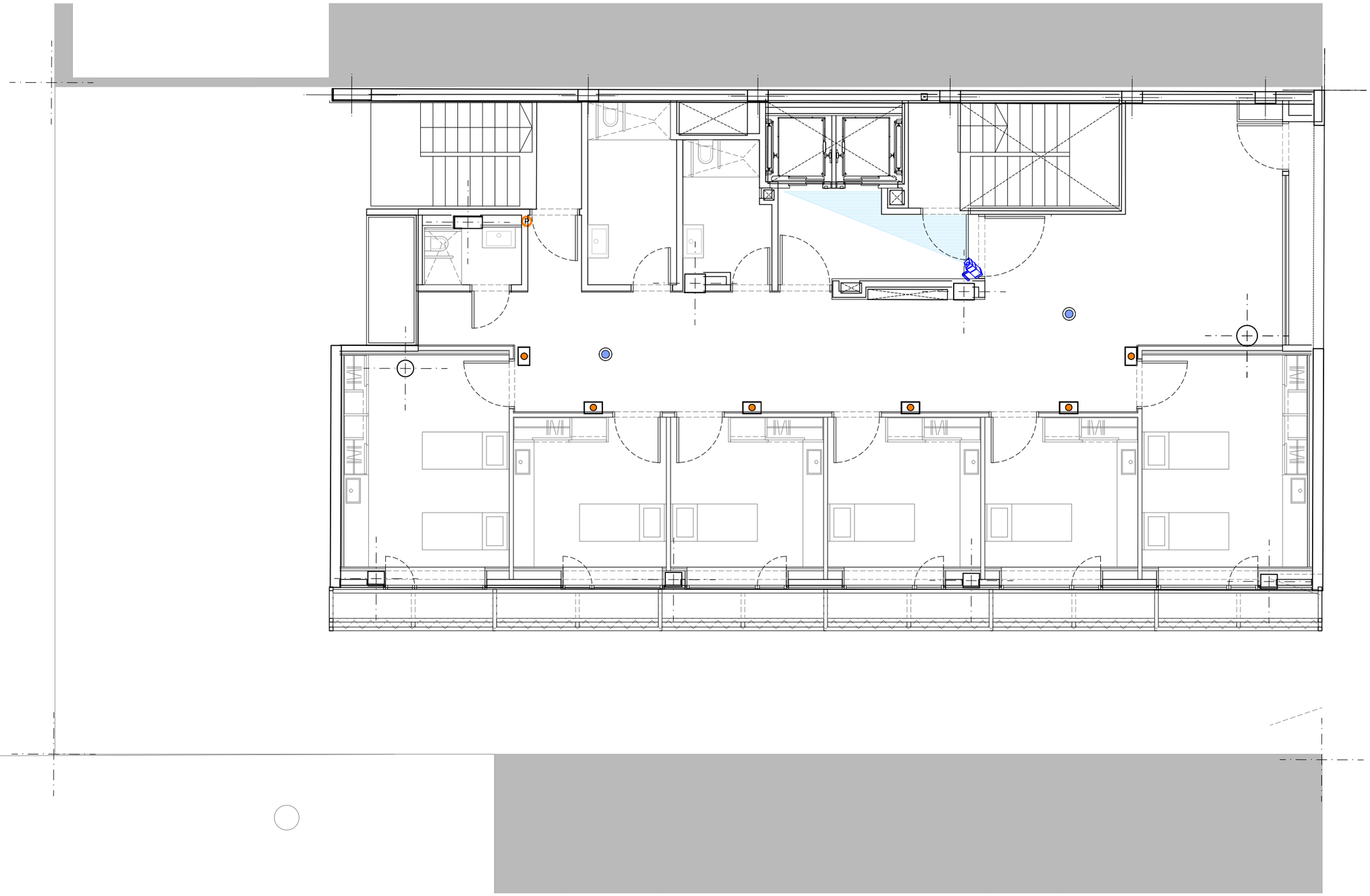
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:

CCTV INSTALLATIONS
FLOOR 3

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-CCA-01.5A.dwg	CCA-01.5A



LEGEND			
	MINIDOMO INTERIOR	V	VIDEO RECORDER=4U
	MINIDOMO EXTERIOR		LECTOR
	FIXED CAMERA		ROOM TIMER
	VARIFOCAL CAMERA TO EXTERIOR	P	OPENING PUSHBUTTON
	COMPUTER TO CONTROL		CCTV CAMERA VISION FIELD

PROPIETARI:
FUNDACIÓ PRIVADA CATALANA PER A LA PARÀLISI CEREBRAL (FCPC)

PROJECTE:
PROJECTE EXECUTIU-RESIDENCIA PER A PERSONES AFECTADES DE PARÀLISI CEREBRAL
22@ C. LLULL 163 BARCELONA

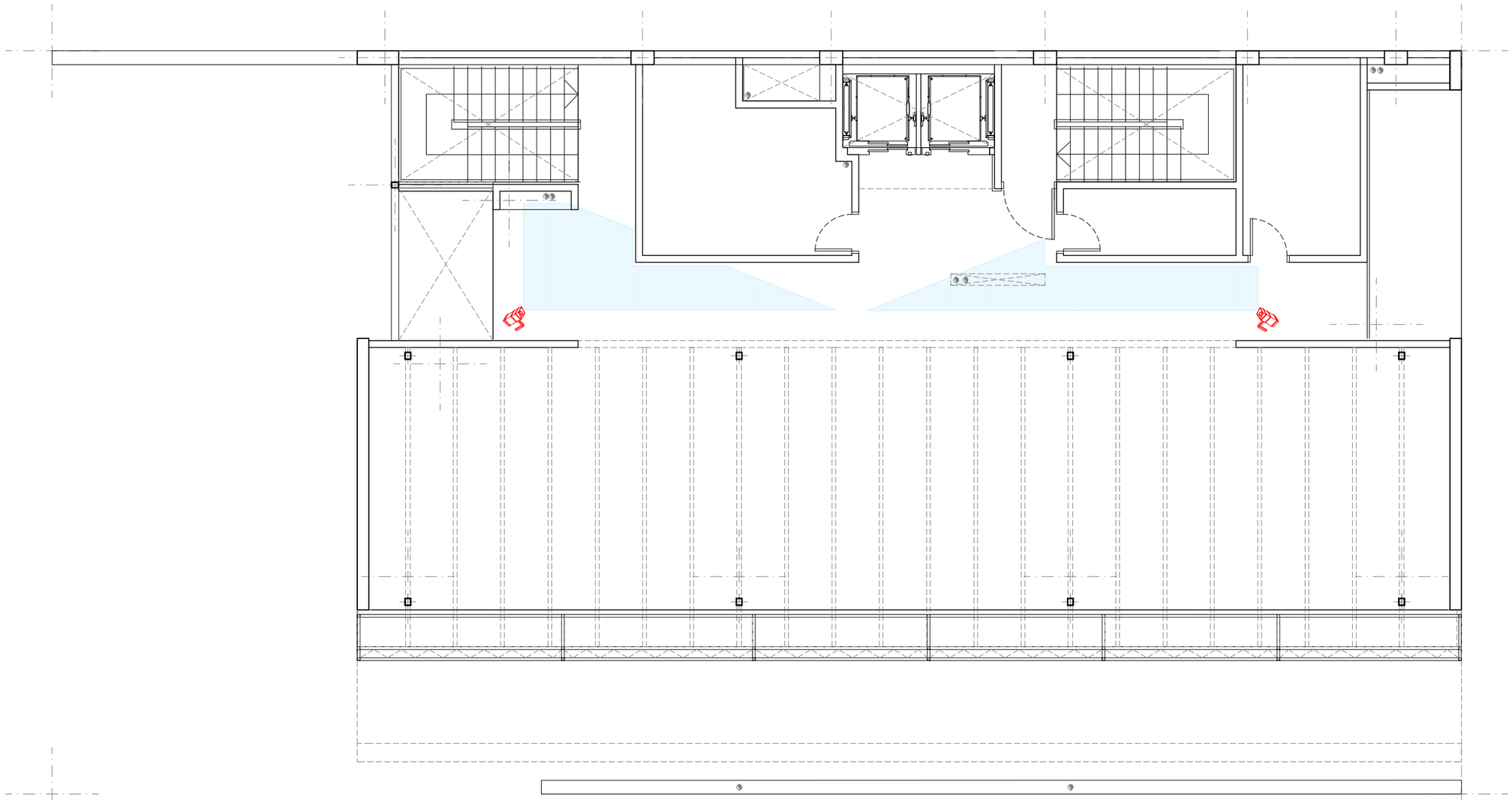
PLÀNOL:
CCTV INSTALLATIONS
FLOORS 4 AND 5

PROJECTE BÀSIC REDACTAT PER:
ALFREDO ARRIBAS
Arquitectos Asociados

gpo

AUTOR:
ROBERTO RIPOLL
ARQUITECTE
COAC Nº 24.755-3

ESCALA:	DATA:	FITXER	No. PLÀNOL:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-CCA-01.6A.dwg	CCA-01.6A



LEGEND			
	MINIDOMO INTERIOR	V	VIDEO RECORDER=4U
	MINIDOMO EXTERIOR		LECTOR
	FIXED CAMERA		ROOM TIMER
	VARIFOCAL CAMERA TO EXTERIOR	P	OPENING PUSHBUTTON
	COMPUTER TO CONTROL		CCTV CAMERA VISION FIELD

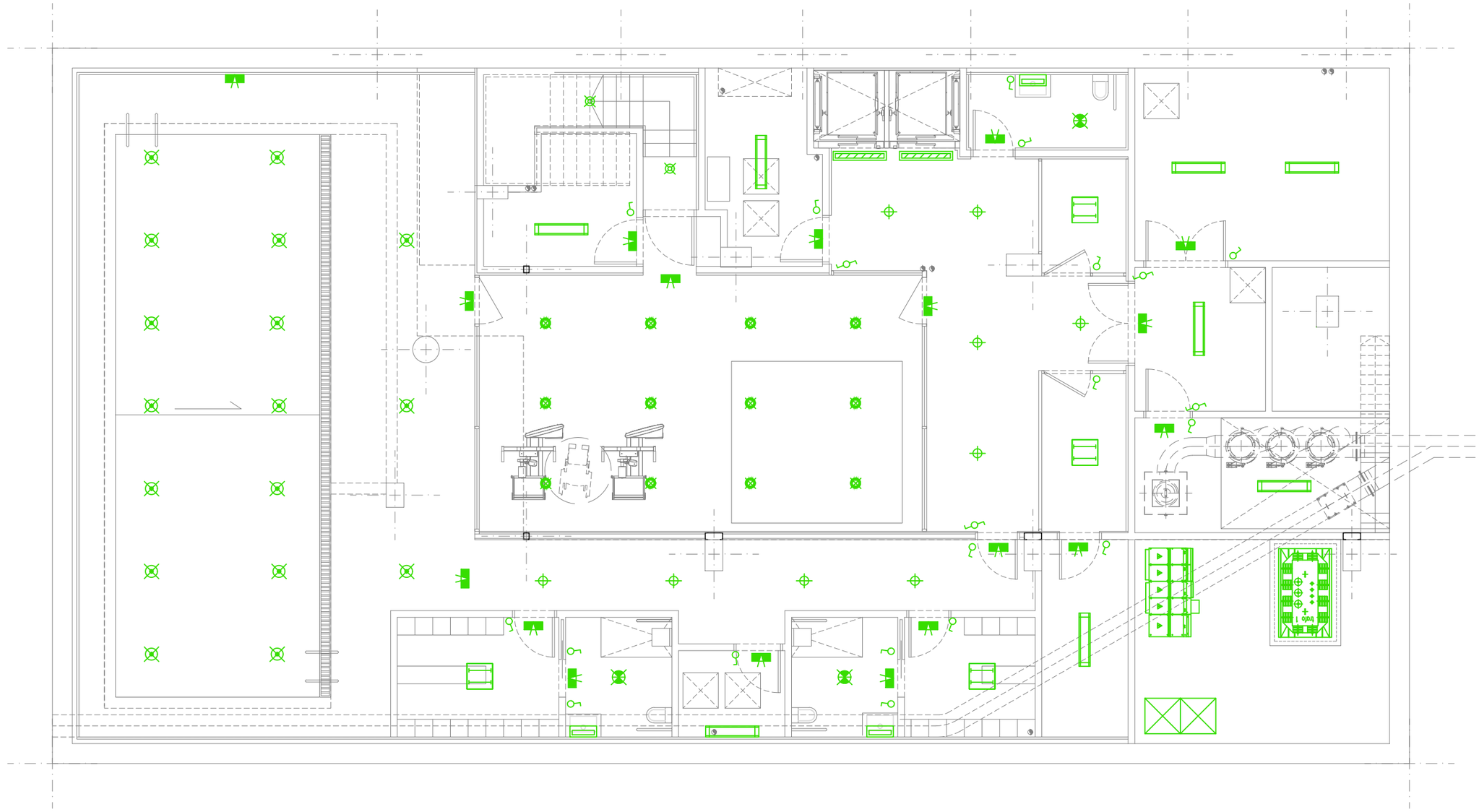
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
CCTV INSTALLATIONS
FLOOR 6

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-CCA-01.7A.dwg	CCA-01.7A



LEGEND

- Superficial light 3W
- Ilight for elevator 3W
- Superficial airtight light 3W
- Square light 5W recessed
- Indirect wall light 3W (L=625mm)
- Bathroom light
- Watertight outdoor apply for wall
- Emergency autonomy
- Watertight Emergency autonomy IP66
- Downlight of low voltage cylindrical surface IP65
- Downlight surface
- Watertight downlight
- Built–in downlight 3 W Installux
- Built–in downlight 3 W Installux
- Watertight and built–in downlight by terrace
- Interruptor
- Commutator

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

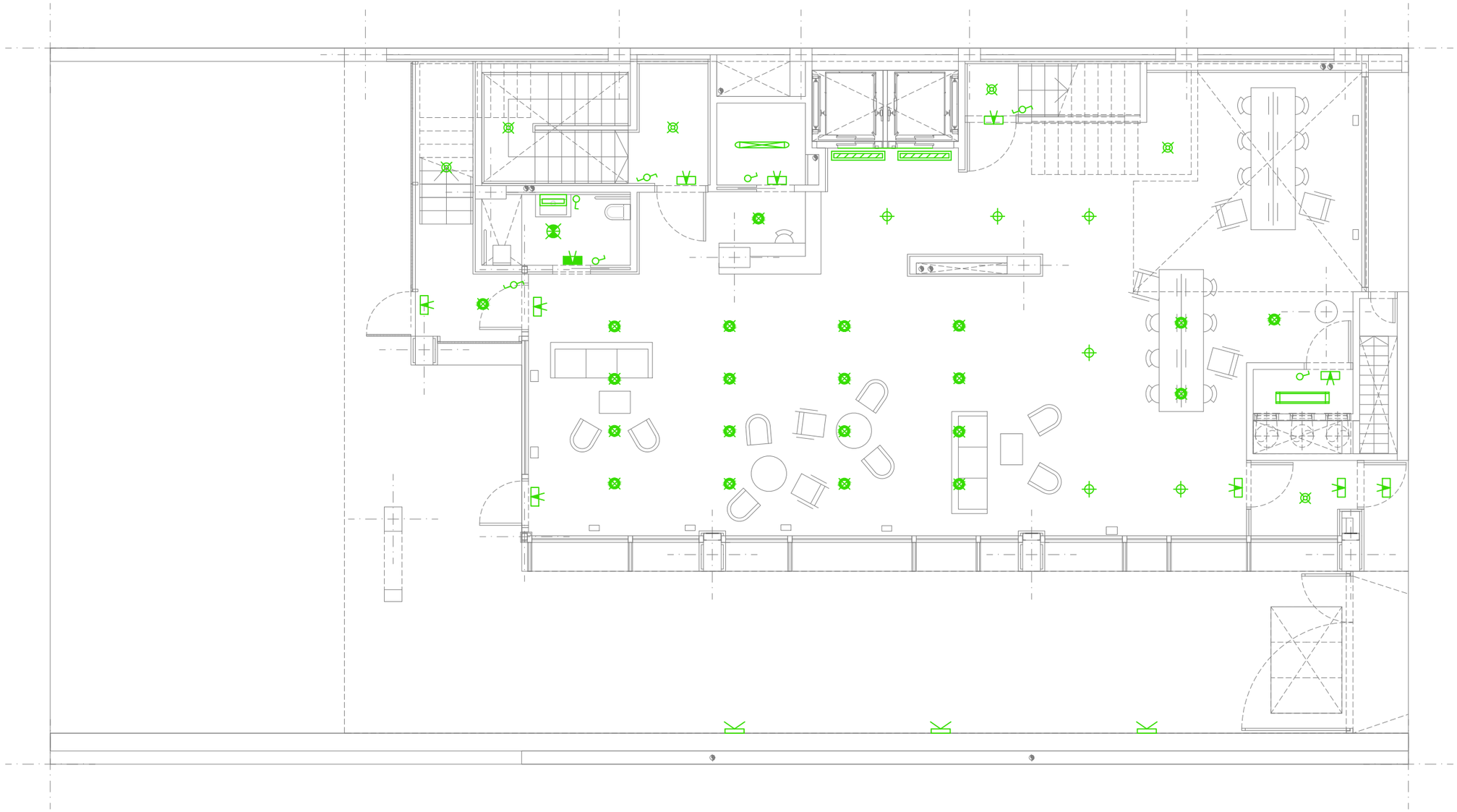
PLAN:

ELECTRICITY INSTALLATIONS
UNDERGROUND FLOOR

AUTHOR:

ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IEL-01.1A.dwg	IEL-01.1A



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- Watertight and built-in downlight by terrace
- Interruptor
- Commutator

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

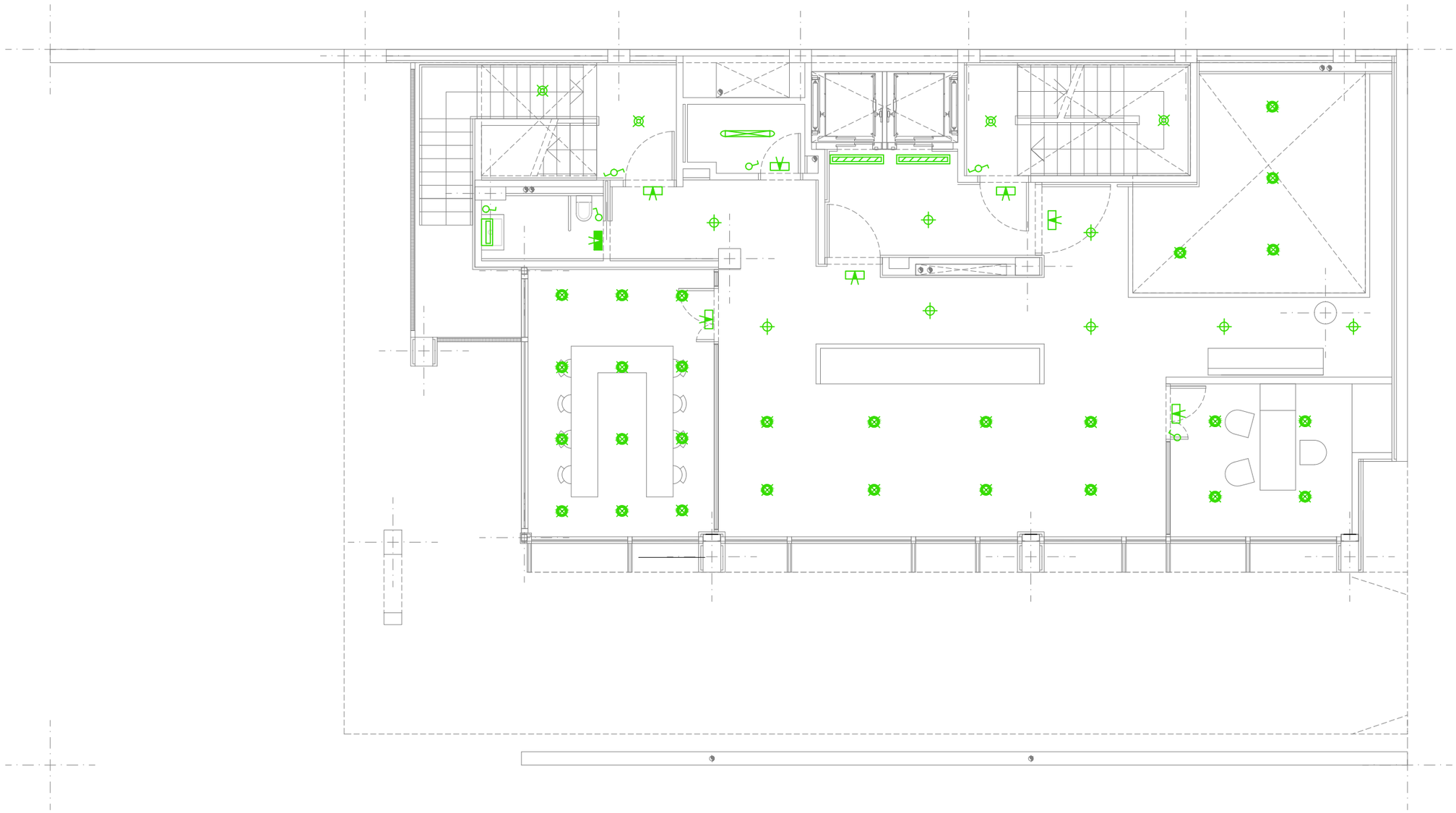
PLAN:

ELECTRICITY INSTALLATIONS
GROUND FLOOR

AUTHOR:

ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IEL-01.1A.dwg	IEL-01.2A



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- Watertight and built–in downlight by terrace
- Interruptor
- Commutator

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

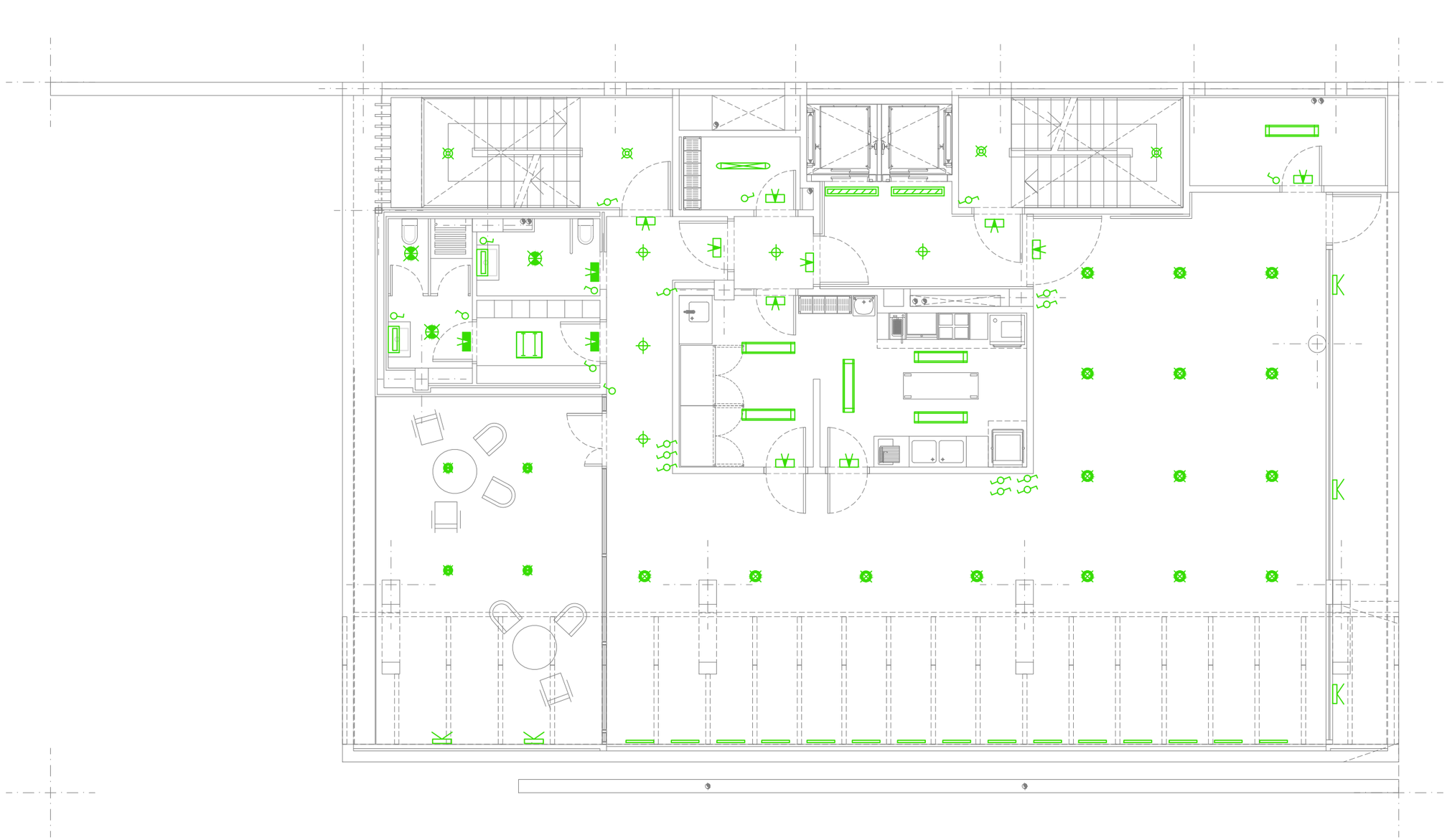
PLAN:

ELECTRICITY INSTALLATIONS
FIRST FLOOR

AUTHOR:

ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IEL-01.3A.dwg	IEL-01.3A



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- Watertight and built–in downlight by terrace
- Interruptor
- Commutator

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RAČUNALNIŠTVO IN INFORMATIKO

PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:

ELECTRICITY INSTALLATIONS
SECOND FLOOR

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IEL-01.4A.dwg	IEL-01.4A

AUTHOR:
ANA GONZÁLEZ PUEYO

LEGEND

- Superficial light 3W
- Light for elevator 3W
- Superficial airtight light 3W
- Square light 5W recessed
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- Commutator

OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
ELECTRICITY INSTALLATIONS
THIRD FLOOR

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IEL-01.5A.dwg	IEL-01.5A

LEGEND

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- Built–in downlight 3 W Installux
- Watertight and built–in downlight by terrace
- Interruptor
- Commutator

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

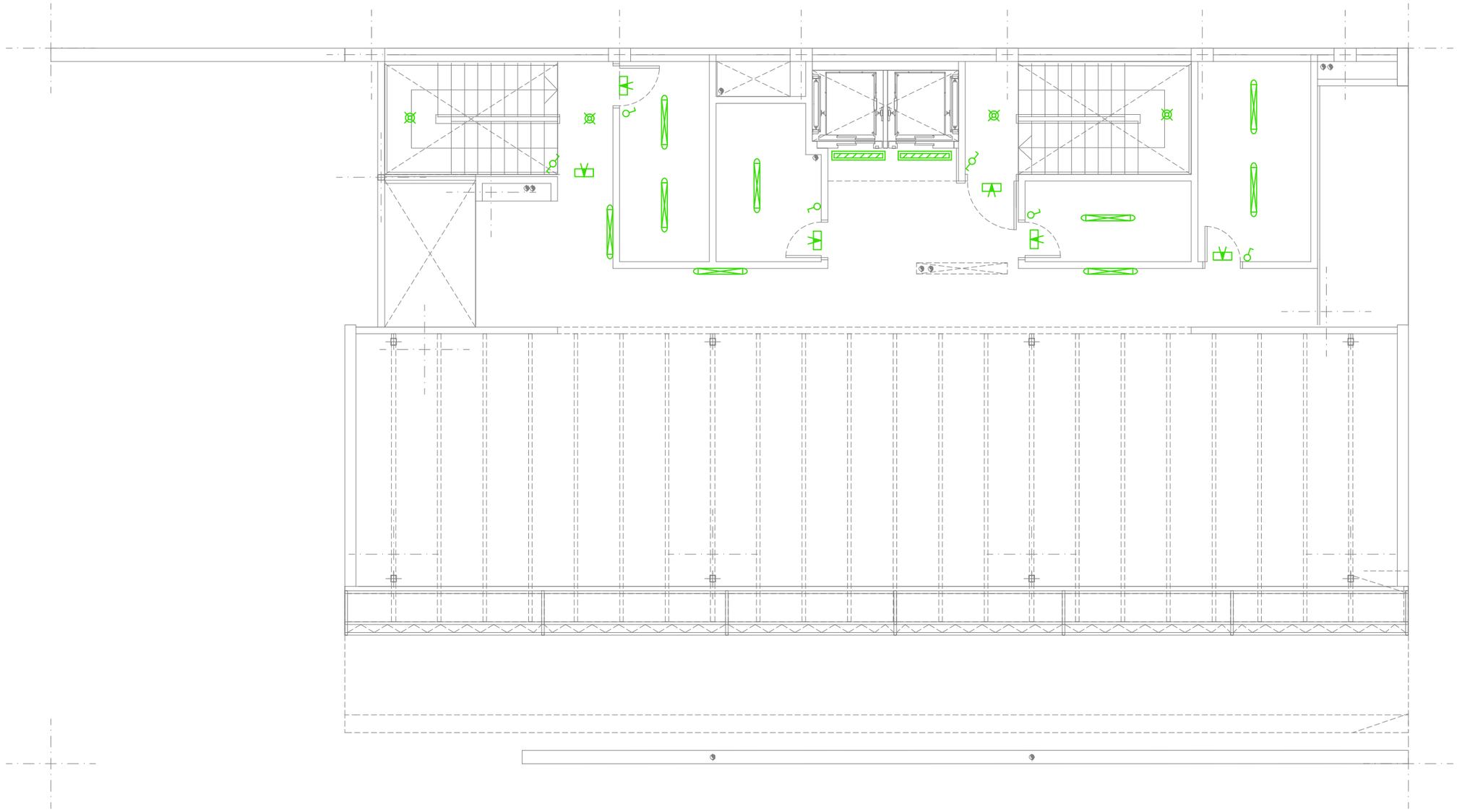
PLAN:

ELECTRICITY INSTALLATIONS
FLOOR 4 AND 5

AUTHOR:

ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IEL-01.6A.dwg	IEL-01.6A



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- Built–in downlight 3 W Installux
- Built–in downlight 3 W Installux
- Watertight and built–in downlight by terrace
- Interruptor
- Commutator

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:

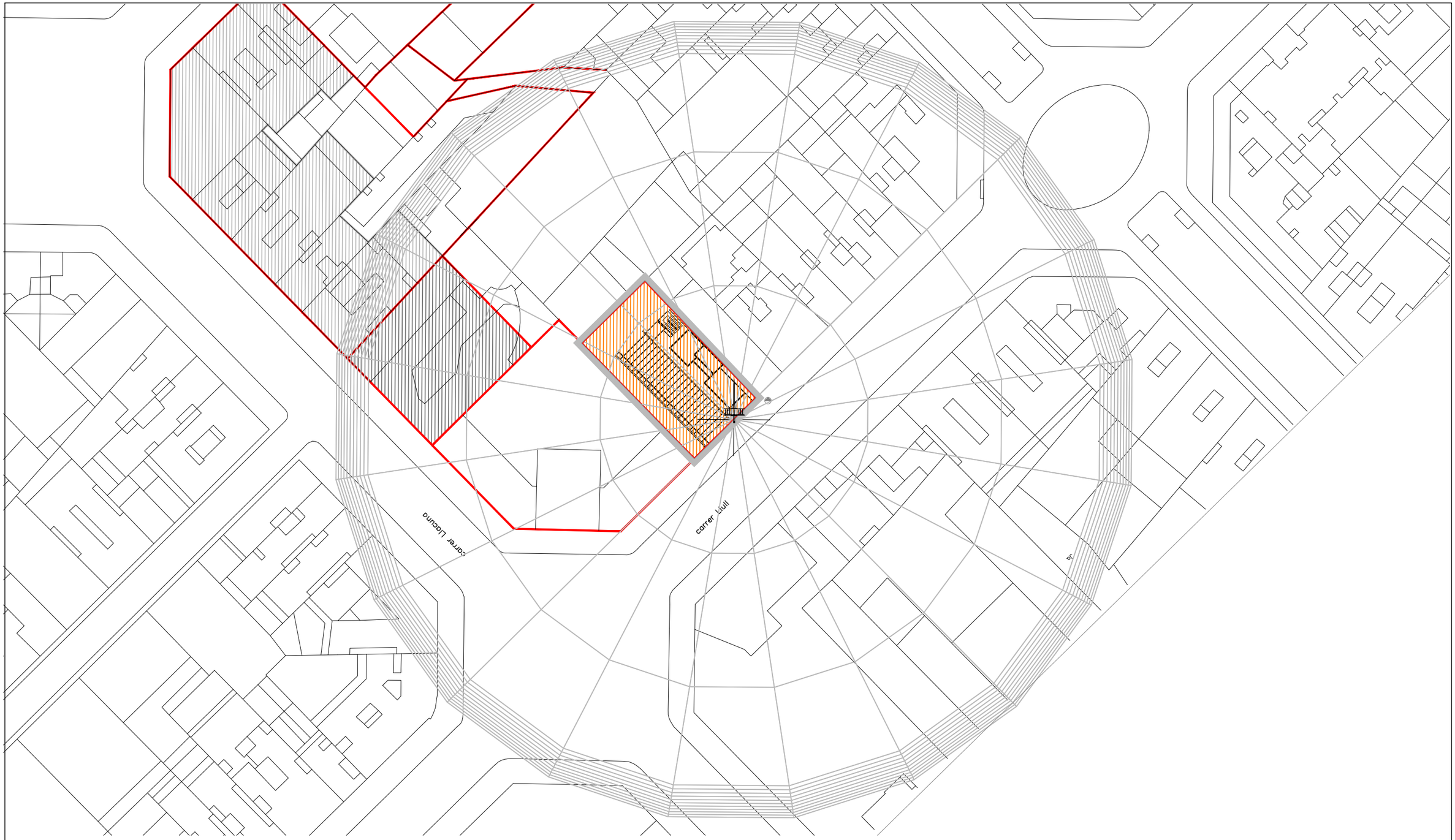
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:

ELECTRICITY INSTALLATIONS
SIXTH FLOOR

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IEL-01.7A.dwg	IEL-01.7A



LEGEND

LIGHTNING ROD M/m: INGRESCO/PDC 3.1 OR SIMILAR

PROTECTION RADIUS OF THE LIGHTNING ROD R=75 m

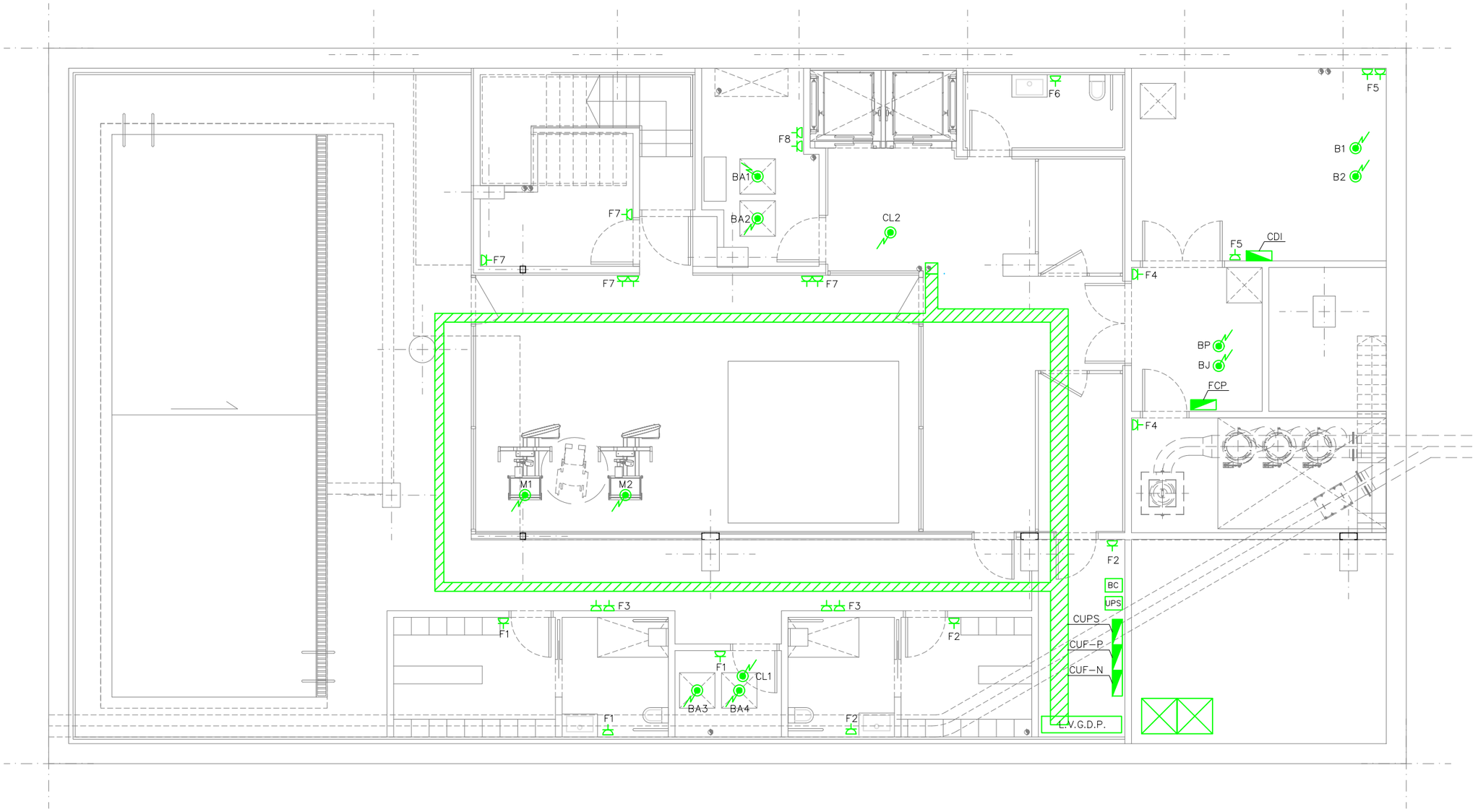
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
EVACUATION AND SIGNALING
FLOOR 6

AUTHOR:
ANA GONZÁLEZ PUEYO

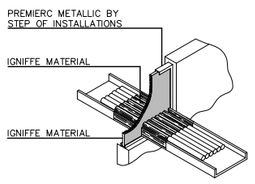
SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IEL-01.8A.dwg	IEL-01.8A



LEGEND

- DISTRIBUTION PANNEL OF POWER TAKE–OFF
- CONNECTION POINT
- POWER OUTLET SCHUKO II+T.T.10/16A
- CANAL UNDER PAVEMENT (H=28mm)
- HOLDABLE TRAY
- PT — FORMAT SET FOR 4 JACKS 10/16A (2 NETWORK+2 UPS) +1 JACKS FOR DATA
- 2PT — FORMAT SET FOR 4 JACKS 10/16A (2 NETWORK+2 UPS) +2 JACKS FOR DATA

DETAIL SAFETY PASS THROUGH FIRE SECTORS



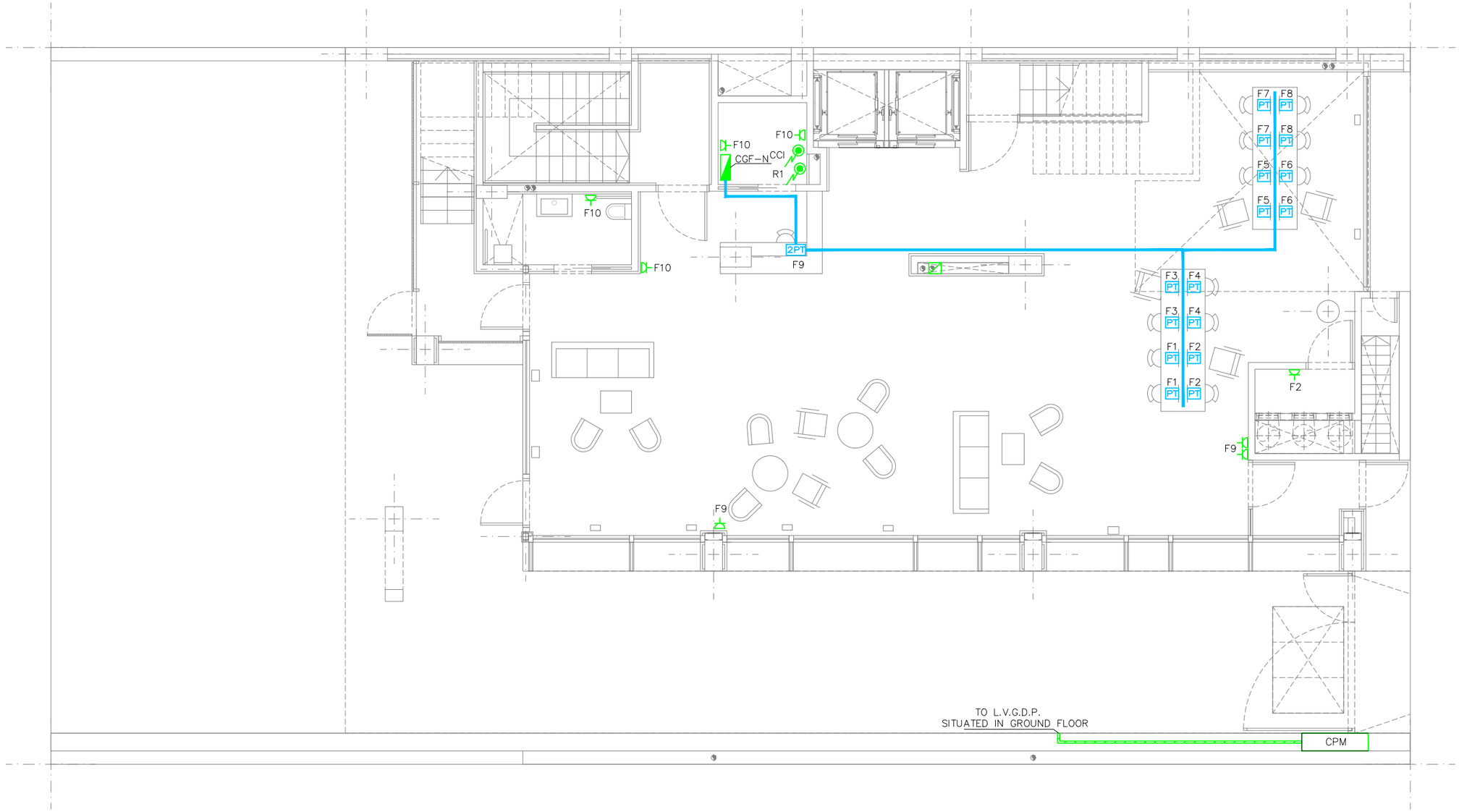
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
FORCE INSTALLATIONS
UNDERGROUND FLOOR

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IFO-01.1A.dwg	IFO-01.1A



LEGEND

- DISTRIBUTION PANNEL OF POWER TAKE-OFF
- CONNECTION POINT
- POWER OUTLET SCHUKO II+T.T.10/16A
- CANAL UNDER PAVEMENT (H=28mm)
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- PT — FORMAT SET FOR 4 JACKS 10/16A (2 NETWORK+2 UPS) +1 JACKS FOR DATA
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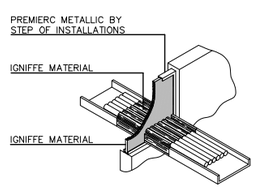
DETAIL SAFETY PASS THROUGH FIRE SECTORS



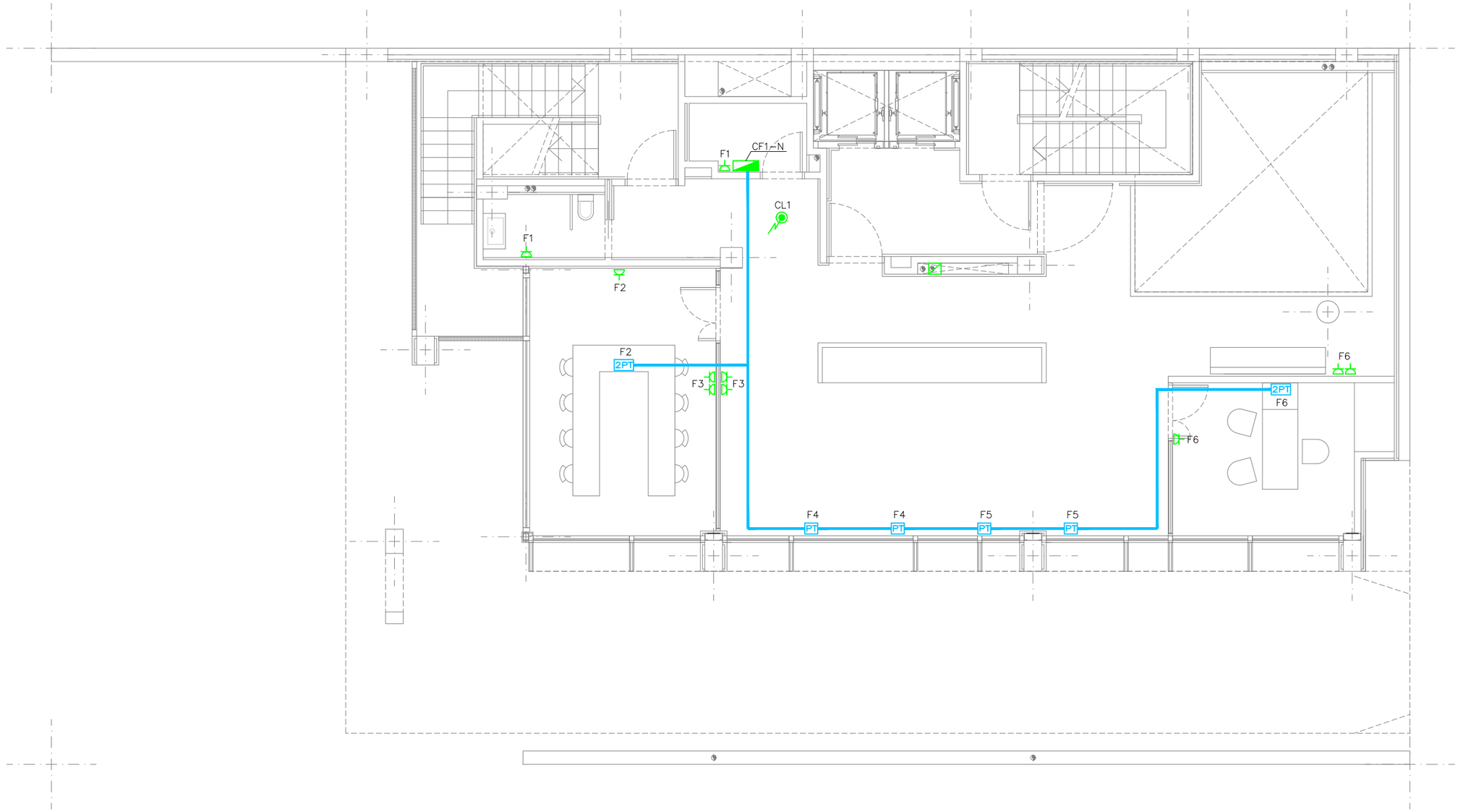
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
FORCE INSTALLATIONS
GROUND FLOOR

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IFO-01.2A.dwg	IFO-01.2A



LEGEND

- DISTRIBUTION PANNEL OF POWER TAKE-OFF
- CONNECTION POINT
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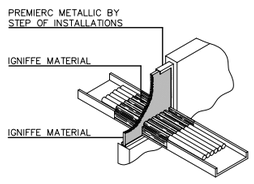


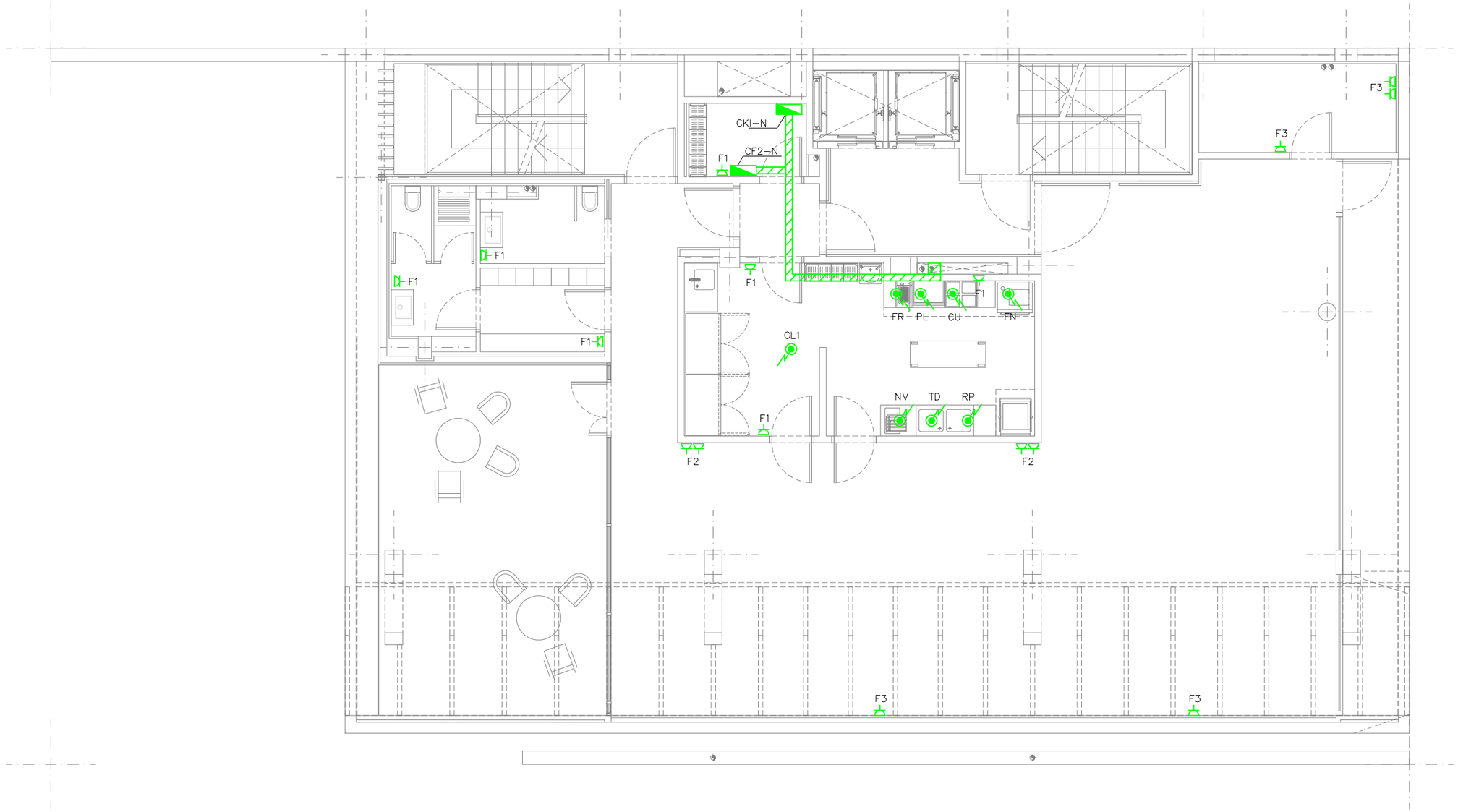
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
FORCE INSTALLATIONS
FLOOR 1

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IFO-01.3A.dwg	IFO-01.3A



LEGEND

- DISTRIBUTION PANNEL OF POWER TAKE–OFF
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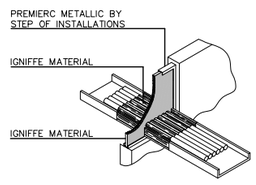


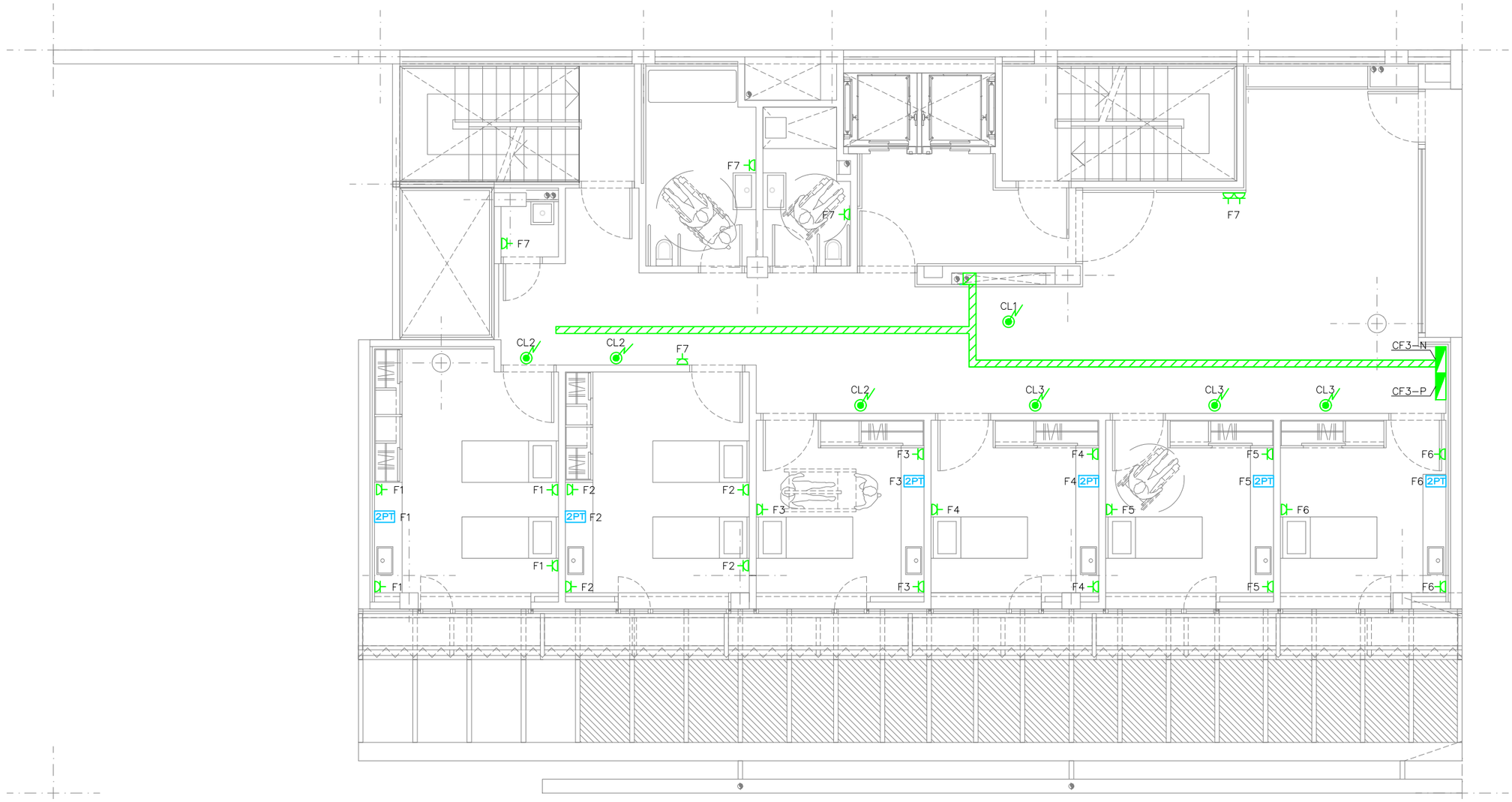
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
FORCE INSTALLATIONS
FLOOR 2

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IFO-01.4A.dwg	IFO-01.4A



LEGEND

DISTRIBUTION PANNEL OF POWER TAKE-OFF	CANAL UNDER PAVEMENT (H=28mm)
CONNECTION POINT	HOLDABLE TRAY
POWER OUTLET SCHUKO II+T.T.10/16A	PT — FORMAT SET FOR 4 JACKS 10/16A (2 NETWORK+2 UPS) +1 JACKS FOR DATA
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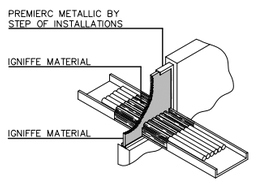


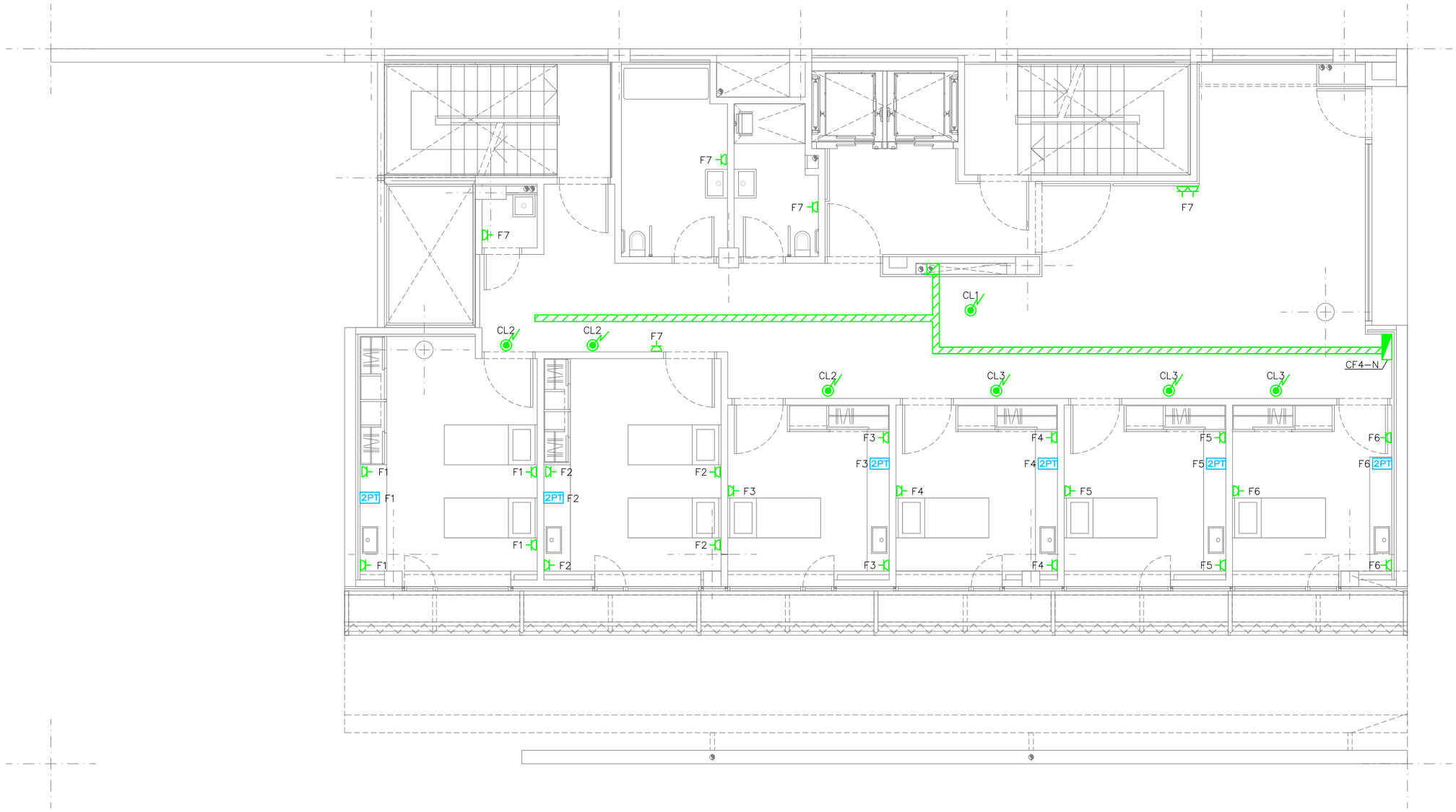
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
FORCE INSTALLATIONS
FLOOR 3

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IFO-01.5A.dwg	IFO-01.5A



LEGEND

- DISTRIBUTION PANNEL OF POWER TAKE–OFF
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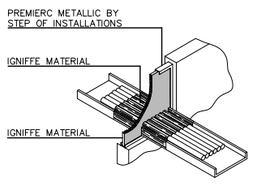

OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
FORCE INSTALLATIONS
FLOORS 4 AND 5

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
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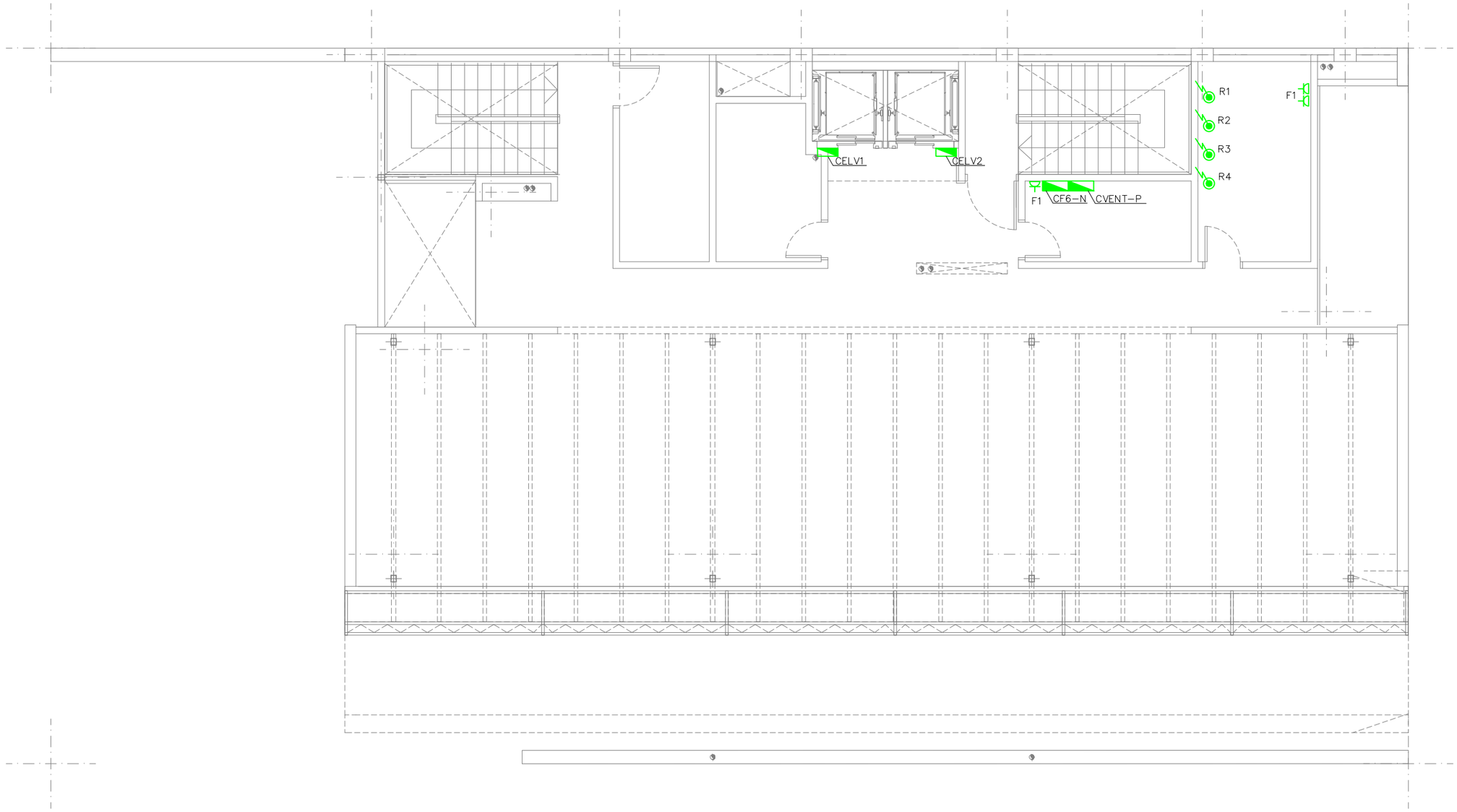

LEGEND

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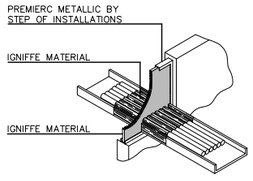
DETAIL SAFETY PASS THROUGH FIRE SECTORS



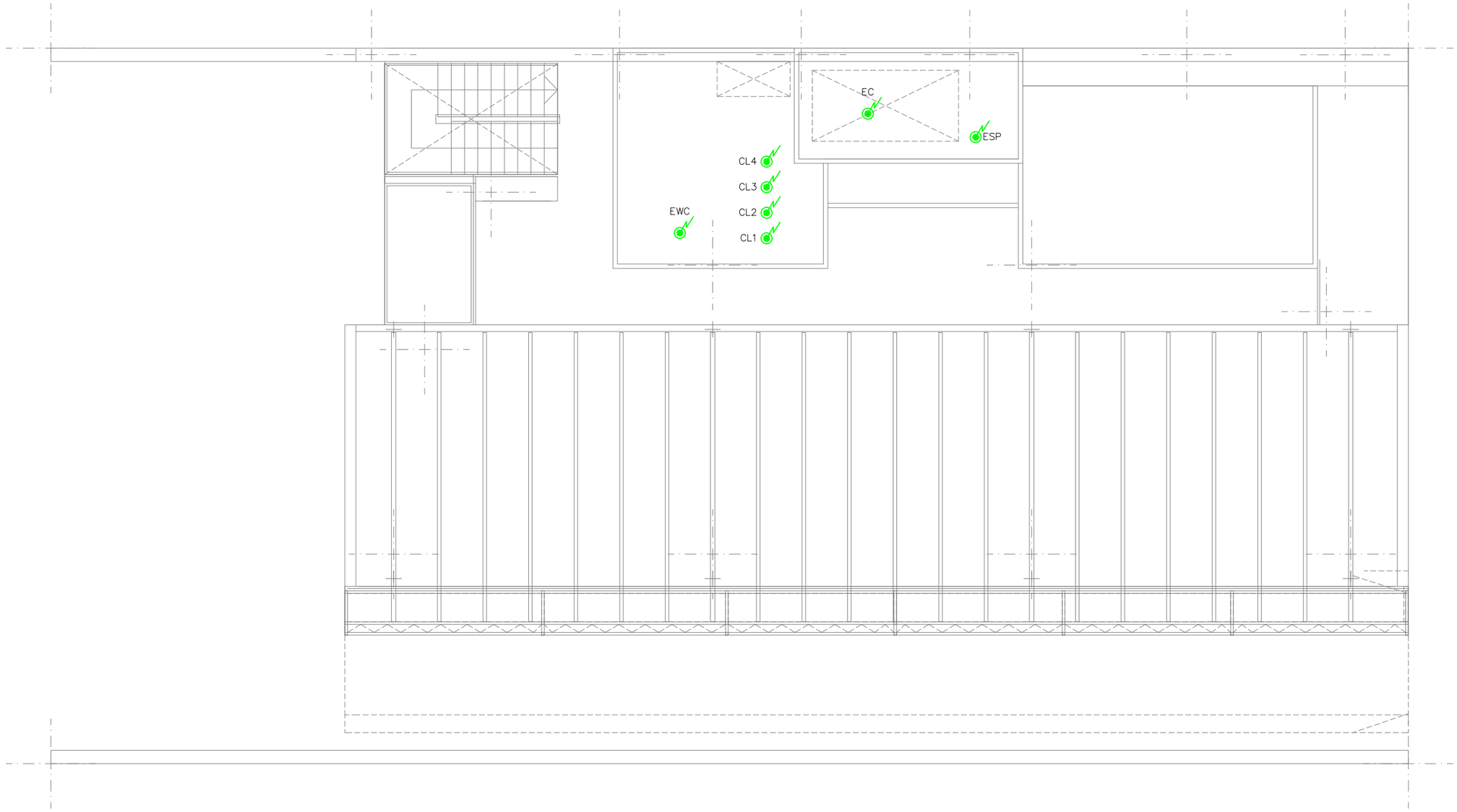
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS AND RELATED DISABILITIES

PLAN:
FORCE INSTALLATIONS
FLOOR 6

AUTHOR:
ANA GONZÁLEZ PUEYO

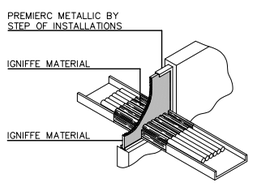
SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IFO-01.7A.dwg	IFO-01.7A



LEGEND

- DISTRIBUTION PANNEL OF POWER TAKE-OFF
- CONNECTION POINT
- POWER OUTLET SCHUKO II+T.T.10/16A
- CANAL UNDER PAVEMENT (H=28mm)
- HOLDABLE TRAY
- PT — FORMAT SET FOR 4 JACKS 10/16A (2 NETWORK+2 UPS) +1 JACKS FOR DATA
- 2PT — FORMAT SET FOR 4 JACKS 10/16A (2 NETWORK+2 UPS) +2 JACKS FOR DATA

DETAIL SAFETY PASS THROUGH FIRE SECTORS



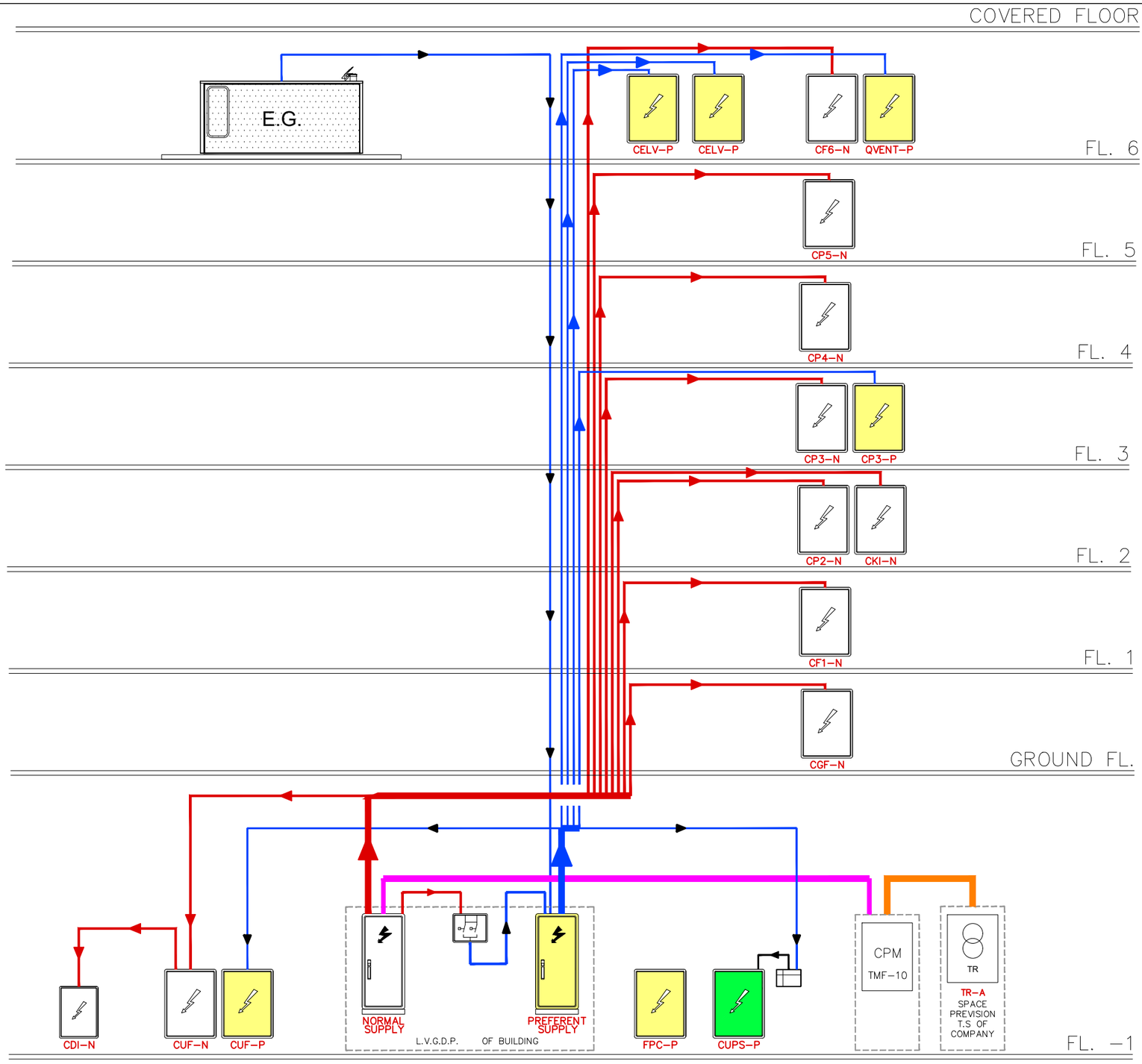
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
FORCE INSTALLATIONS
COVERED FLOOR

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IFO-01.8A.dwg	IFO-01.8A



SCHEME LEGEND

- TRANSFORMATOR
- PROTECTION AND MEASUREMENT BOX.
- A.GENERAL DISTRIBUTION PANNEL
- B.EMERGENCY DISTRIB PANNEL
- C.UPS DISTRIBUTION PANNEL
- A.SUBDISTRIBUTION PANNEL.
- B.EMERGENCY SUBDISTRIB. PANNEL
- C.UPS SUBDISTRIB. PANNEL
- COMMUTATION DISTR. PANNEL
- ELECTROGEN GROUP
- NORMAL DISTRIBUTION LINE
- EMERGENCY DISTRIBUTION LINE
- UPS DISTRIBUTION LINE
- GENERAL DISTRIBUTION LINE
- SUPPLY CONNECTION
- UPS
- ENERGY COUNTER

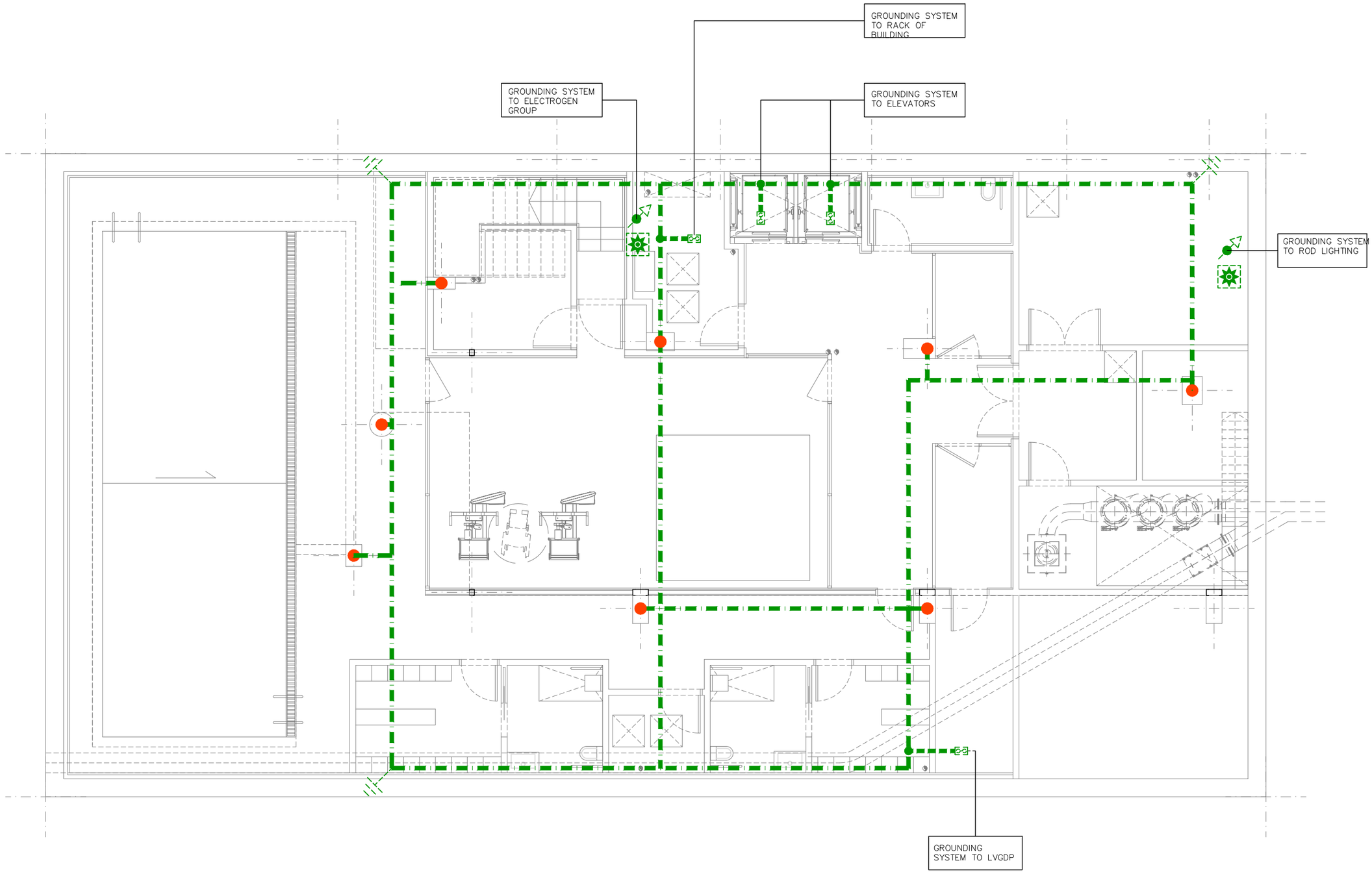
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
FORCE INSTALLATIONS
VERTICAL SCHEME

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IFO-01.9A.dwg	IFO-01.9A



LEGEND

- STEEL CONDUCT INOX PER MESH POST TO EARTH
- SPECIAL WELDING OR PROTECTED GRAPE AGAINST HUMIDITY
- SECTION BOX
- STEEL PICK INOX OF 2 m l ø20 mm.
- WELL STAR OF EARTH WITH STAINLESS PLATE.

OWNER:

UNIVERZA V MARIBORU
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PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS AND RELATED DISABILITIES

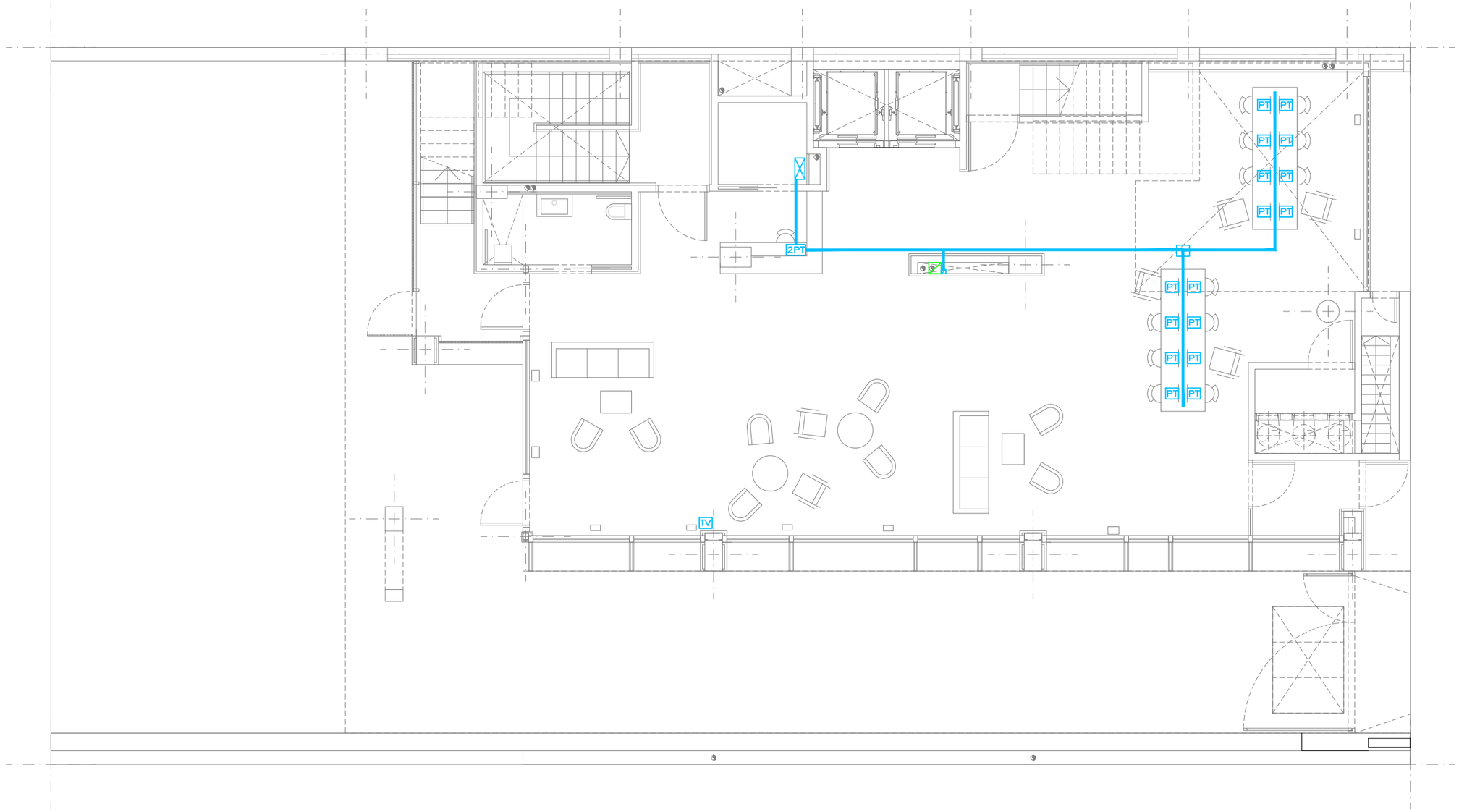
PLAN:

FORCE INSTALLATIONS
UNDERGROUND FLOOR. EARTH NETWORK

AUTHOR:

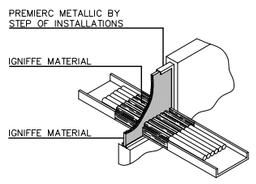
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IFO-01.10A.dwg	IFO-01.10A



LEGEND	
	CHANNEL UNDER PAVING M/m: BTICINO/ Tecnoquint TCP o equi.(H=28mm)
	FLAT SAFETY
	RACK. DISITRIBUTOR FOR FLOOR
	REGISTER CHANNEL UNDER PAVING
PT	FORMAT SET FOR 4 JACKS 10/16A (2 NETWORK+2 UPS) +2 JACKS FOR DATA
2PT	FORMAT SET FOR 4 JACKS 10/16A (2 NETWORK+2 UPS) +2 JACKS FOR DATA RJ45 CAT 6 UTP
TV	TV JACK
	ANTENNA OF TV AND PARABOLIC

DETAIL SAFETY PASS THROUGH FIRE SECTORS



OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

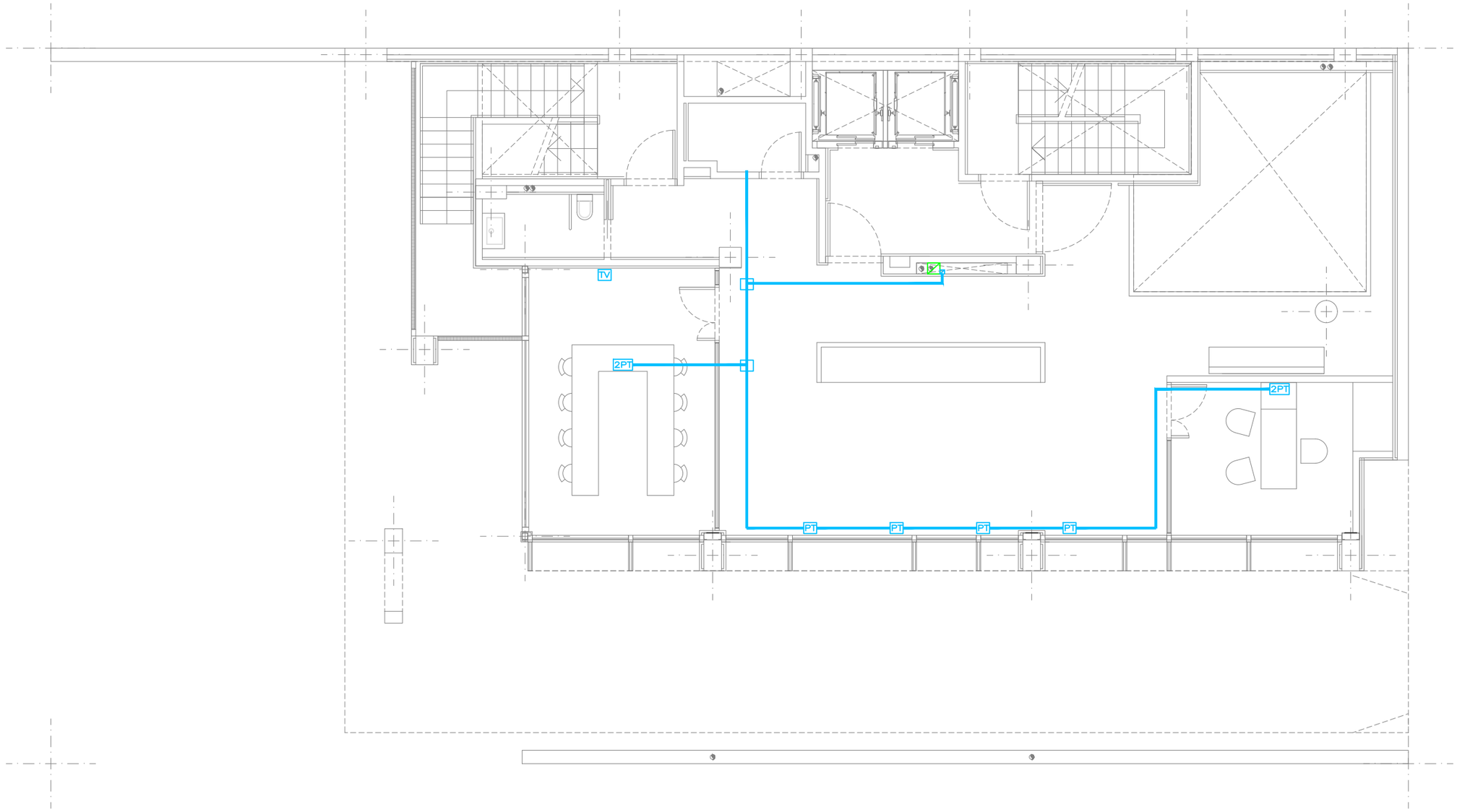
PLAN:

VOICE AND DATA INSTALLATIONS
GROUND FLOOR

AUTHOR:

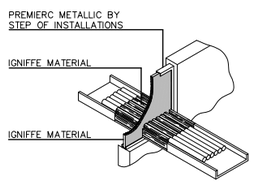
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	february 2018	A08002-E-IVD-01.1A.dwg	IVD-01.1A



LEGEND	
	CHANNEL UNDER PAVING M/m:BTICINO/ Tecnoquint TCP o equi.(H=28mm)
	FLAT SAFETY
	RACK. DISITRIBUTOR FOR FLOOR
	REGISTER CHANNEL UNDER PAVING
PT	FORMAT SET FOR 4 JACKS 10/16A (2 NETWORK+2 UPS) +2 JACKS FOR DATA
2PT	FORMAT SET FOR 4 JACKS 10/16A (2 NETWORK+2 UPS) +2 JACKS FOR DATA RJ45 CAT 6 UTP
TV	TV JACK
	ANTENNA OF TV AND PARABOLIC

DETAIL SAFETY PASS THROUGH FIRE SECTORS



OWNER:
UNIVERZA V MARIBORU
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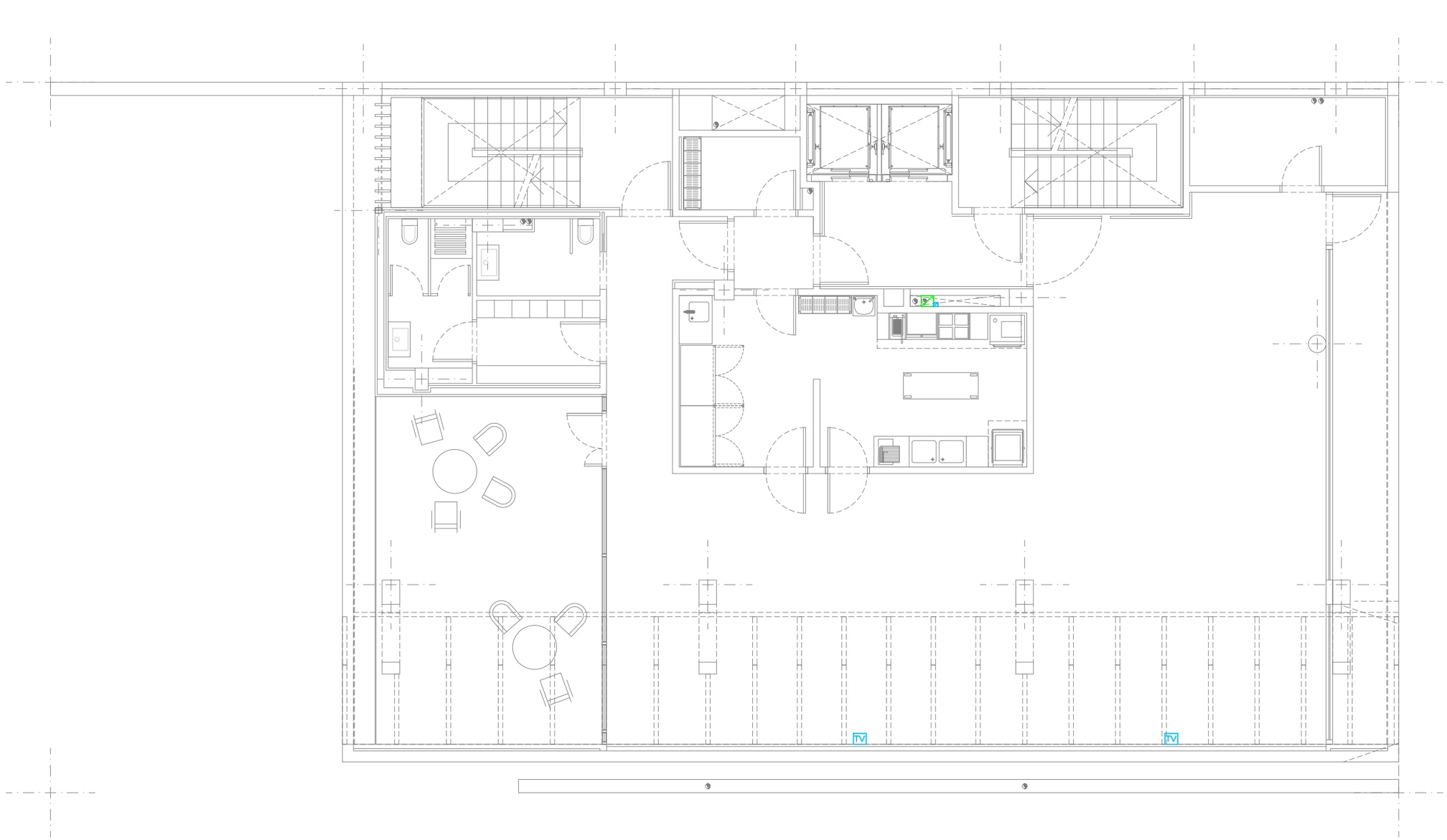
PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
VOICE AND DATA INSTALLATIONS
FLOOR 1

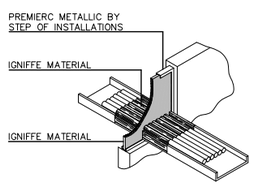
AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IVD-01.2A.dwg	IVD-01.2A



LEGEND	
	CHANNEL UNDER PAVING M/m:BTICINO/ Tecnoquint TCP o equi.(H=28mm)
	FLAT SAFETY
	RACK. DISITRIBUTOR FOR FLOOR
	REGISTER CHANNEL UNDER PAVING
PT	FORMAT SET FOR 4 JACKS 10/16A (2 NETWORK+2 UPS) +2 JACKS FOR DATA
2PT	FORMAT SET FOR 4 JACKS 10/16A (2 NETWORK+2 UPS) +2 JACKS FOR DATA RJ45 CAT 6 UTP
TV	TV JACK
	ANTENNA OF TV AND PARABOLIC

DETAIL SAFETY PASS THROUGH FIRE SECTORS



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PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
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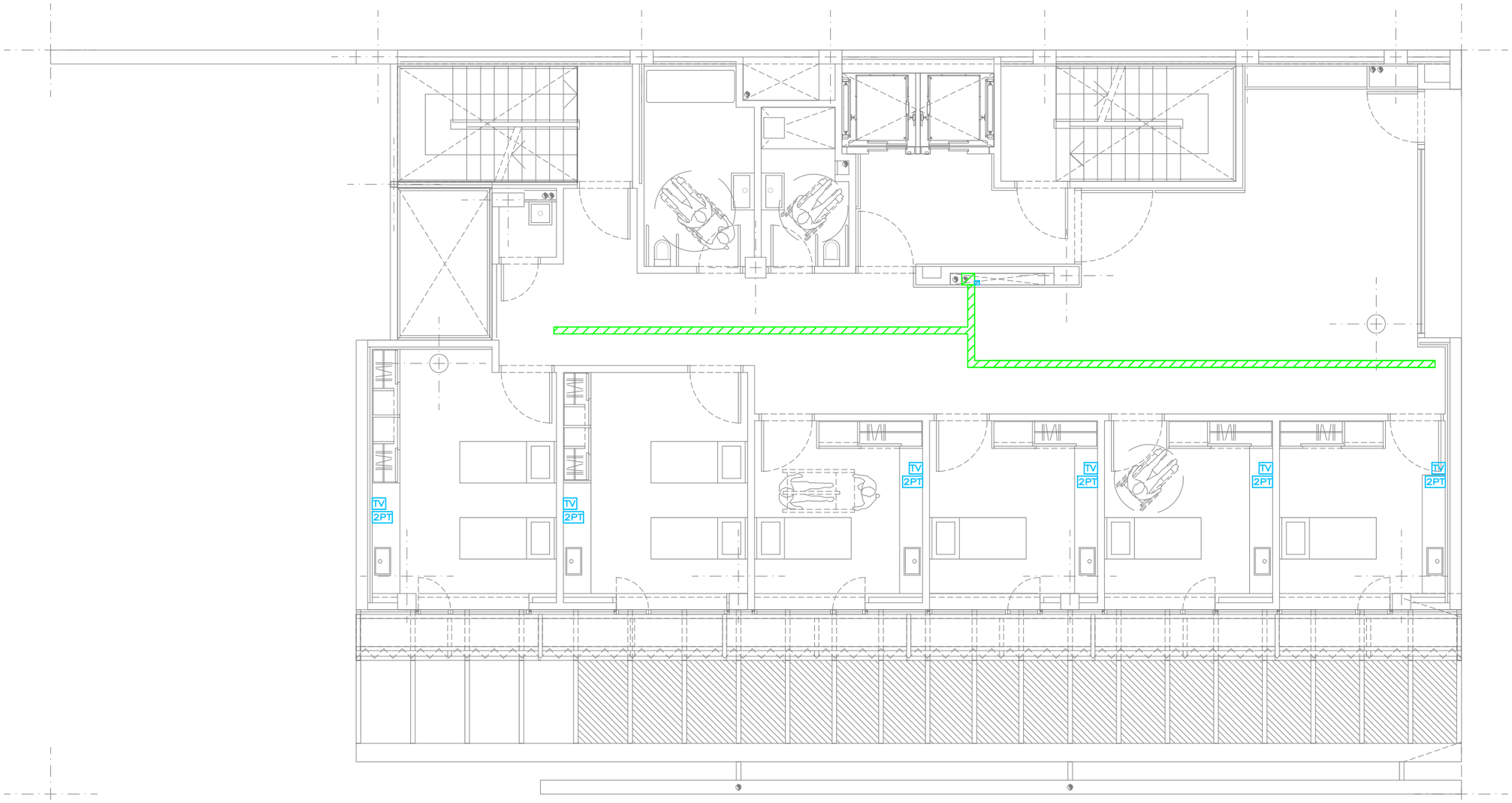
PLAN:

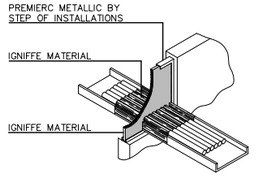
VOICE AND DATA INSTALLATIONS
FLOOR 2

AUTHOR:

ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IVD-01.3A.dwg	IVD-01.3A



LEGEND	DETAIL SAFETY PASS THROUGH FIRE SECTORS
CHANNEL UNDER PAVING M/m: BTICINO/ Tecnoquint TCP o equi.(H=28mm)	
FLAT SAFETY	
RACK. DISITRIBUTOR FOR FLOOR	
REGISTER CHANNEL UNDER PAVING	
PT FORMAT SET FOR 4 JACKS 10/16A (2 NETWORK+2 UPS) +2 JACKS FOR DATA	
2PT FORMAT SET FOR 4 JACKS 10/16A (2 NETWORK+2 UPS) +2 JACKS FOR DATA RJ45 CAT 6 UTP	
TV TV JACK	
ANTENNA OF TV AND PARABOLIC	

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:

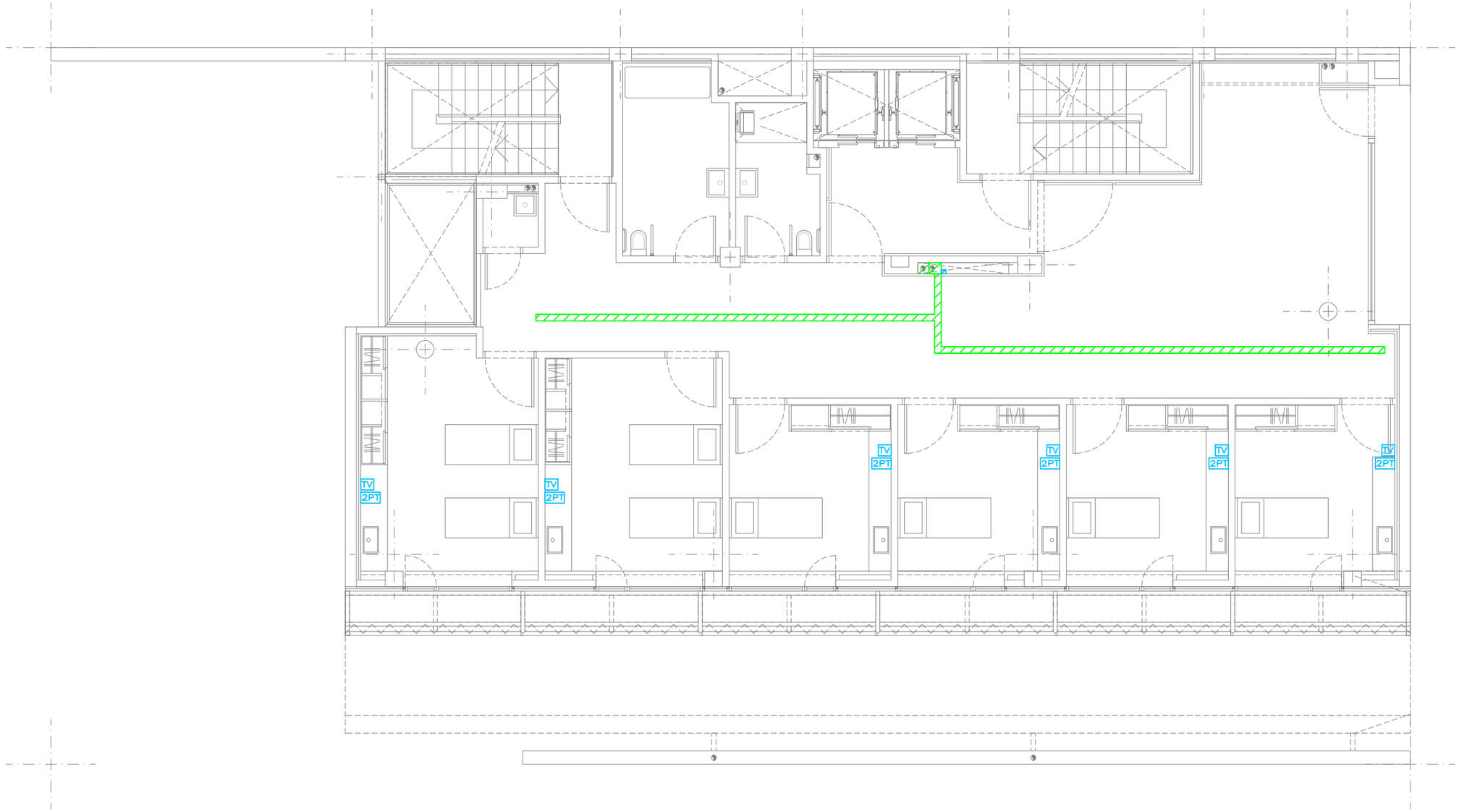
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:

VOICE AND DATA INSTALLATIONS
FLOOR 3

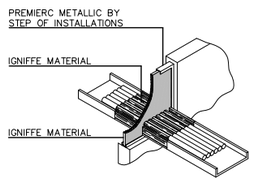
AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IVD-01.4A.dwg	IVD-01.4A



LEGEND	
	CHANNEL UNDER PAVING M/m:BTICINO/ Tecnoquint TCP o equi.(H=28mm)
	FLAT SAFETY
	RACK. DISITRIBUTOR FOR FLOOR
	REGISTER CHANNEL UNDER PAVING
PT	FORMAT SET FOR 4 JACKS 10/16A (2 NETWORK+2 UPS) +2 JACKS FOR DATA
2PT	FORMAT SET FOR 4 JACKS 10/16A (2 NETWORK+2 UPS) +2 JACKS FOR DATA RJ45 CAT 6 UTP
TV	TV JACK
	ANTENNA OF TV AND PARABOLIC

DETAIL SAFETY PASS THROUGH FIRE SECTORS



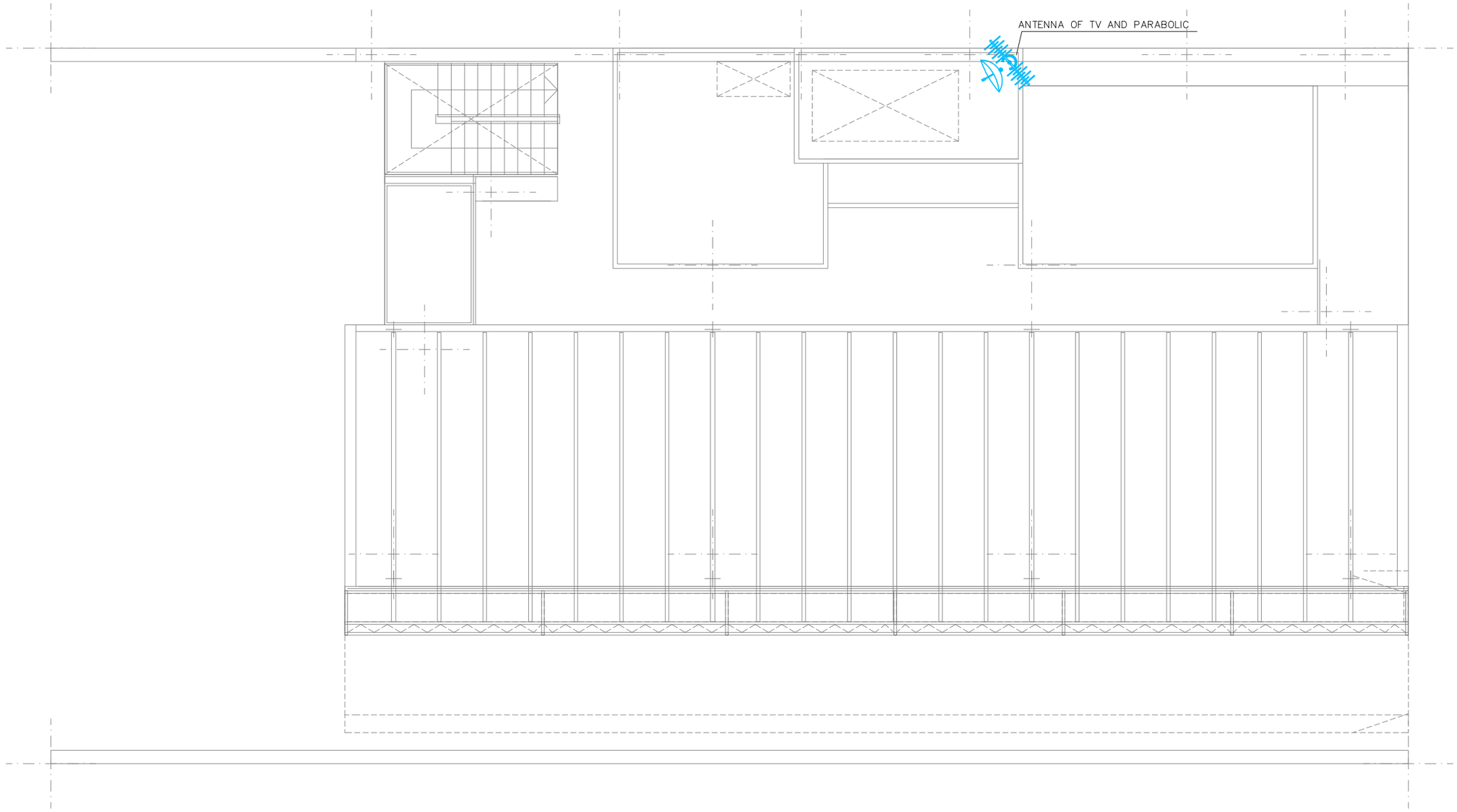
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
VOICE AND DATA INSTALLATIONS
FLOORS 4 AND 5

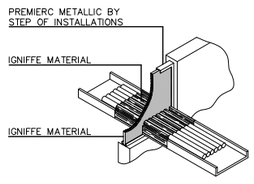
AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IVD-01.5A.dwg	IVD-01.5A



LEGEND	
	CANAL UNDER PAVEMENT.(H=28mm)
	HOLDABLE TRAY
	RACK. DISITRIBUTOR FOR FLOOR
	REGISTER CHANNEL UNDER PAVING
PT	FORMAT SET FOR 4 JACKS 10/16A (2 NETWORK+2 UPS) +1 JACKS FOR DATA
2PT	FORMAT SET FOR 4 JACKS 10/16A (2 NETWORK+2 UPS) +2 JACKS FOR DATA RJ45 CAT 6 UTP
TV	TV JACK
	ANTENNA OF TV AND PARABOLIC

DETAIL SAFETY PASS THROUGH FIRE SECTORS



OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
FORCE INSTALLATIONS
COVERED FLOOR

AUTHOR:
ANA GONZÁLEZ PUEYO

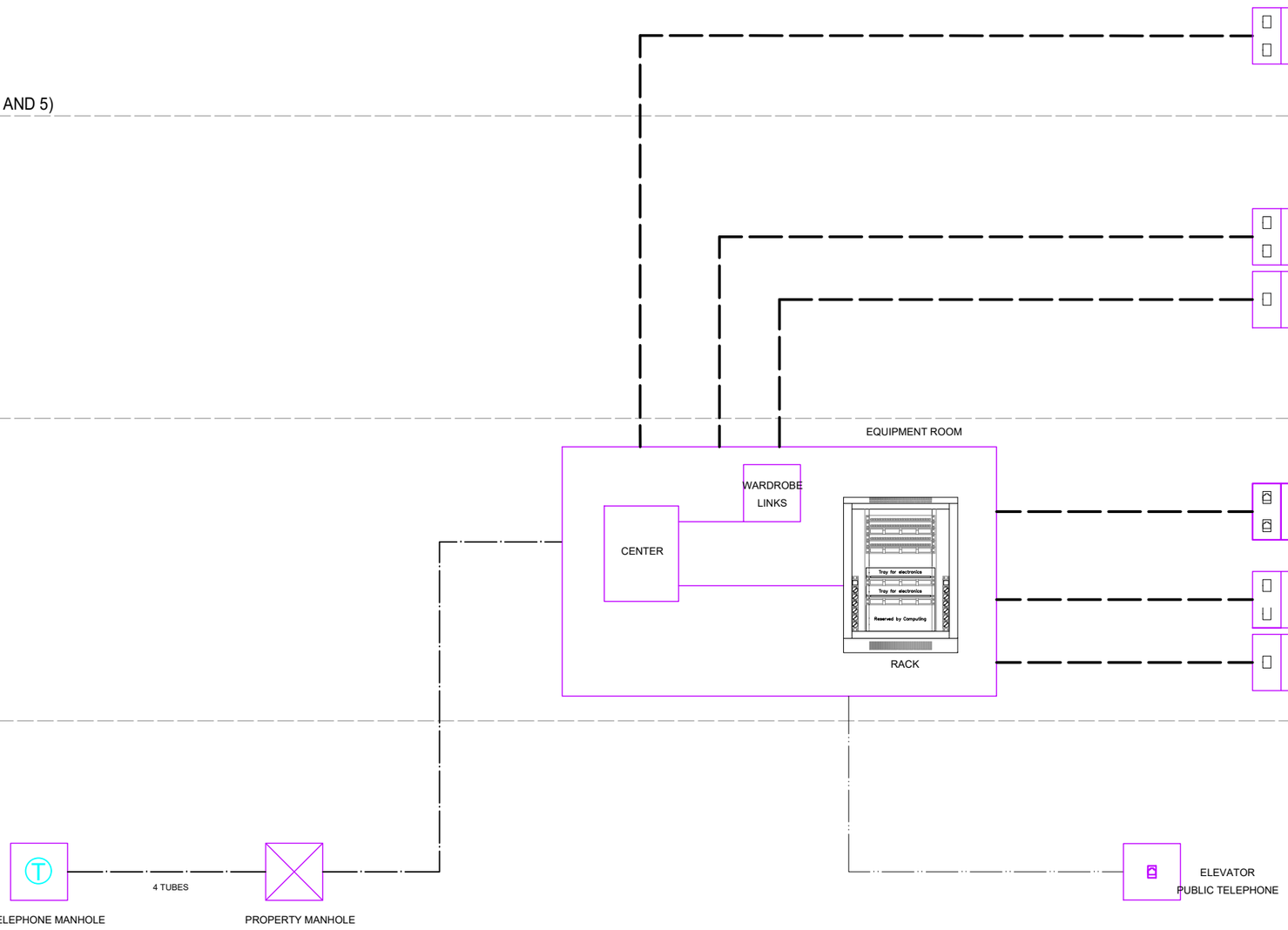
SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IVD-01.6A.dwg	IVD-01.6A

TYPE FLOOR (3,4 AND 5)

FLOOR 1

GROUND FLOOR

UNDERGROUND FLOOR



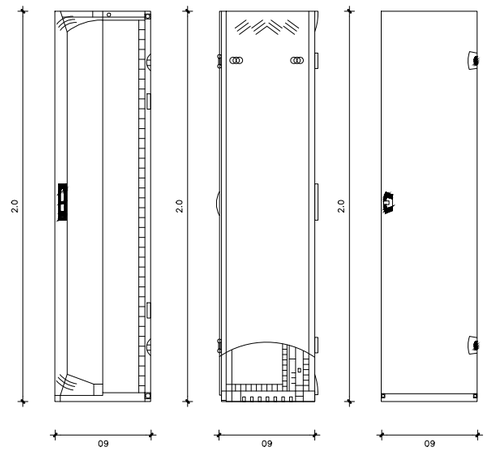
LEGEND

BOX WORKPLACE
WITH 4 JACKS OF VOICE AND DATA

TELEPHONE CABLE

WIRING 2 X 0.5mm2

BOX WORKPLACE
WITH 1 JACKS OF VOICE AND DATA



RACK DETAIL

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

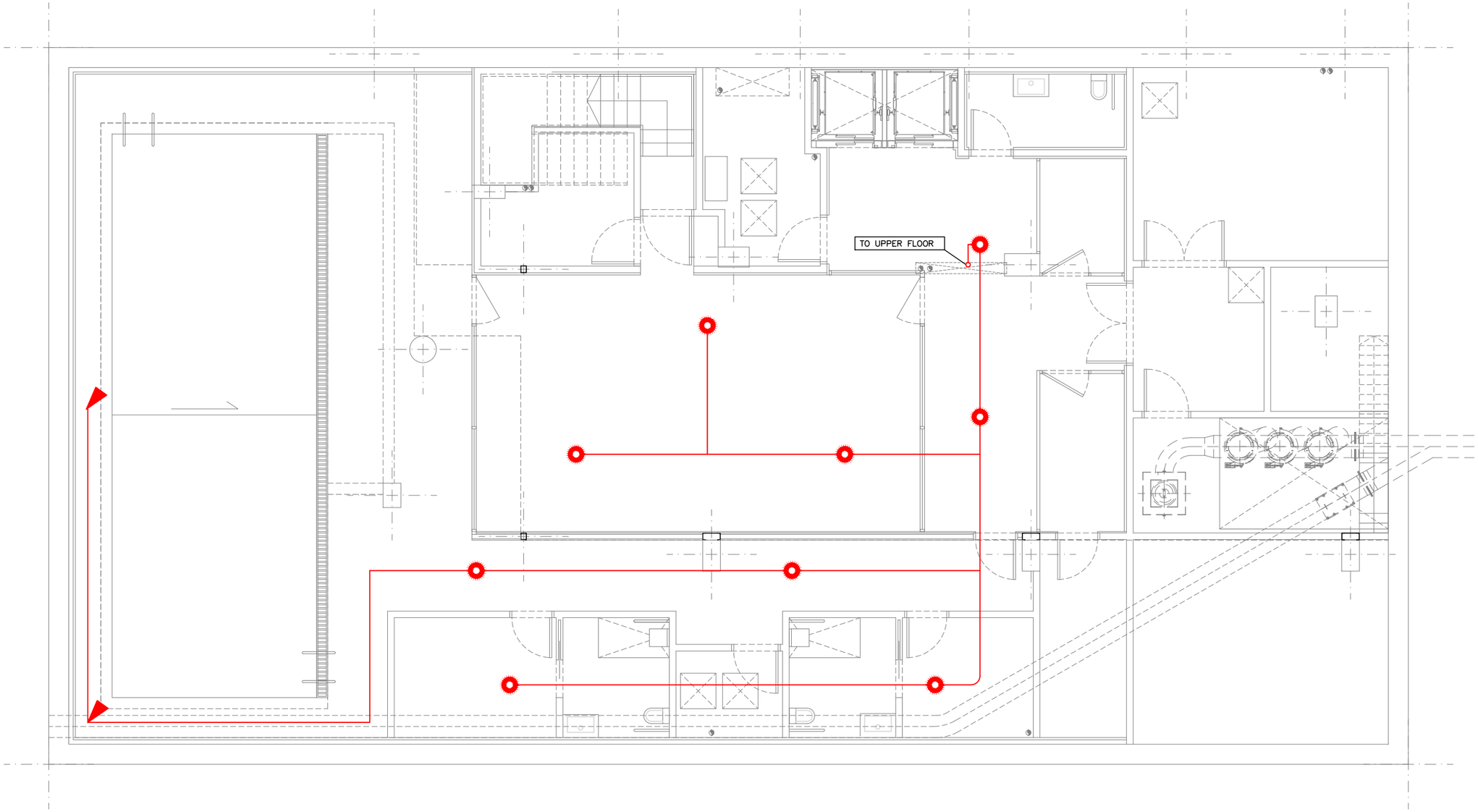
PLAN:

VOICE AND DATA INSTALLATIONS
PRINCIPLE SCHEME

AUTHOR:

ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IVD-01.7A.dwg	IVD-01.7A



LEGEND

- SPEAKER
- CEILING SPEAKER
- MEGAPHONY LINE
- WARDROBE RACK OF MEGAPHONE (RACK)
- ADVERTISEMENT DESK

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RAČUNALNIŠTVO IN INFORMATIKO

PROJECT:

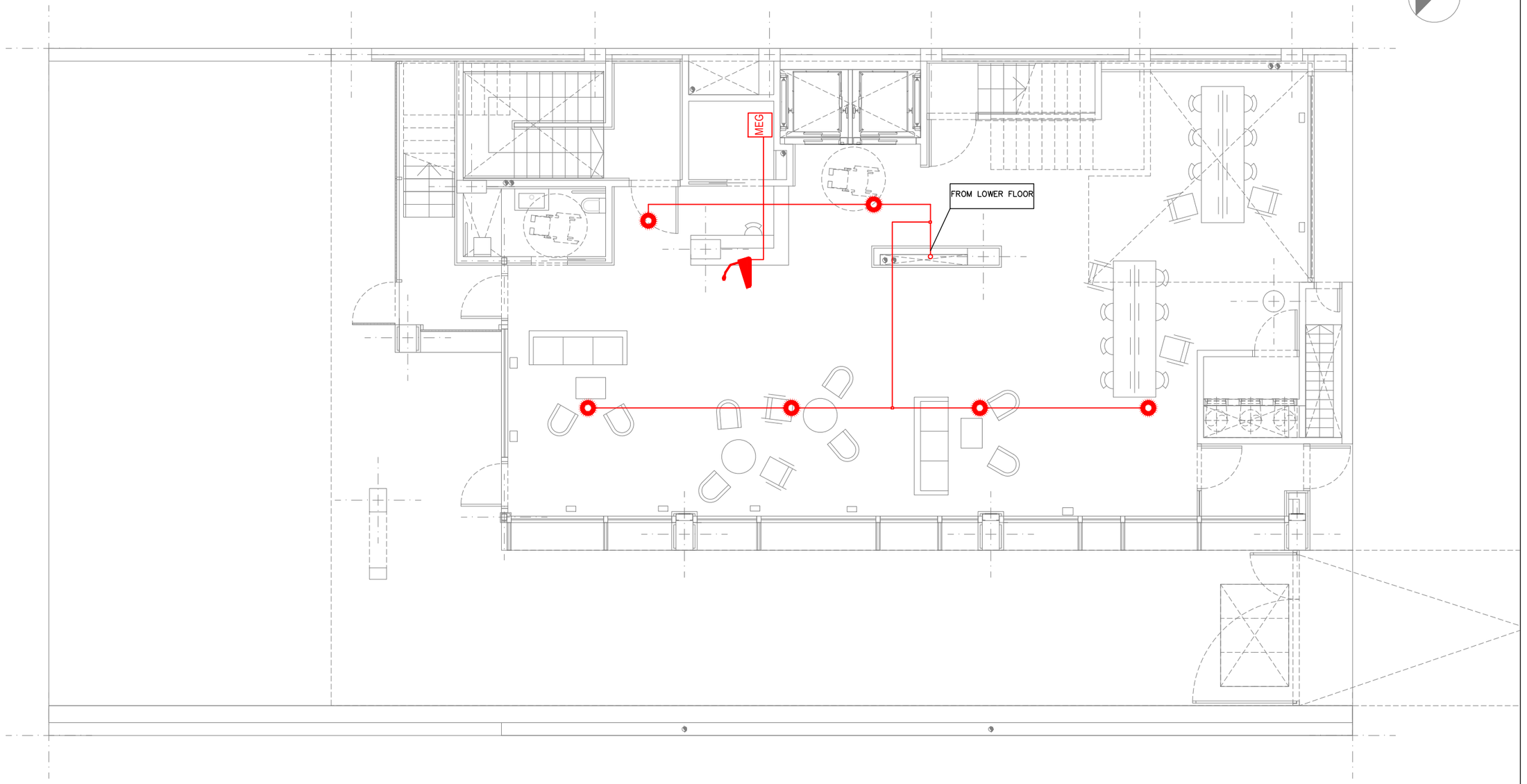
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:

MEGAPHONE INSTALLATIONS
UNDERGROUND FLOOR

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IME-01.1A.dwg	IME-01.1A

AUTHOR:
ANA GONZÁLEZ PUEYO



LEGEND

- SPEAKER
- CEILING SPEAKER
- MEGAPHONY LINE
- WARDROBE RACK OF MEGAPHONE
- ADVERTISEMENT DESK

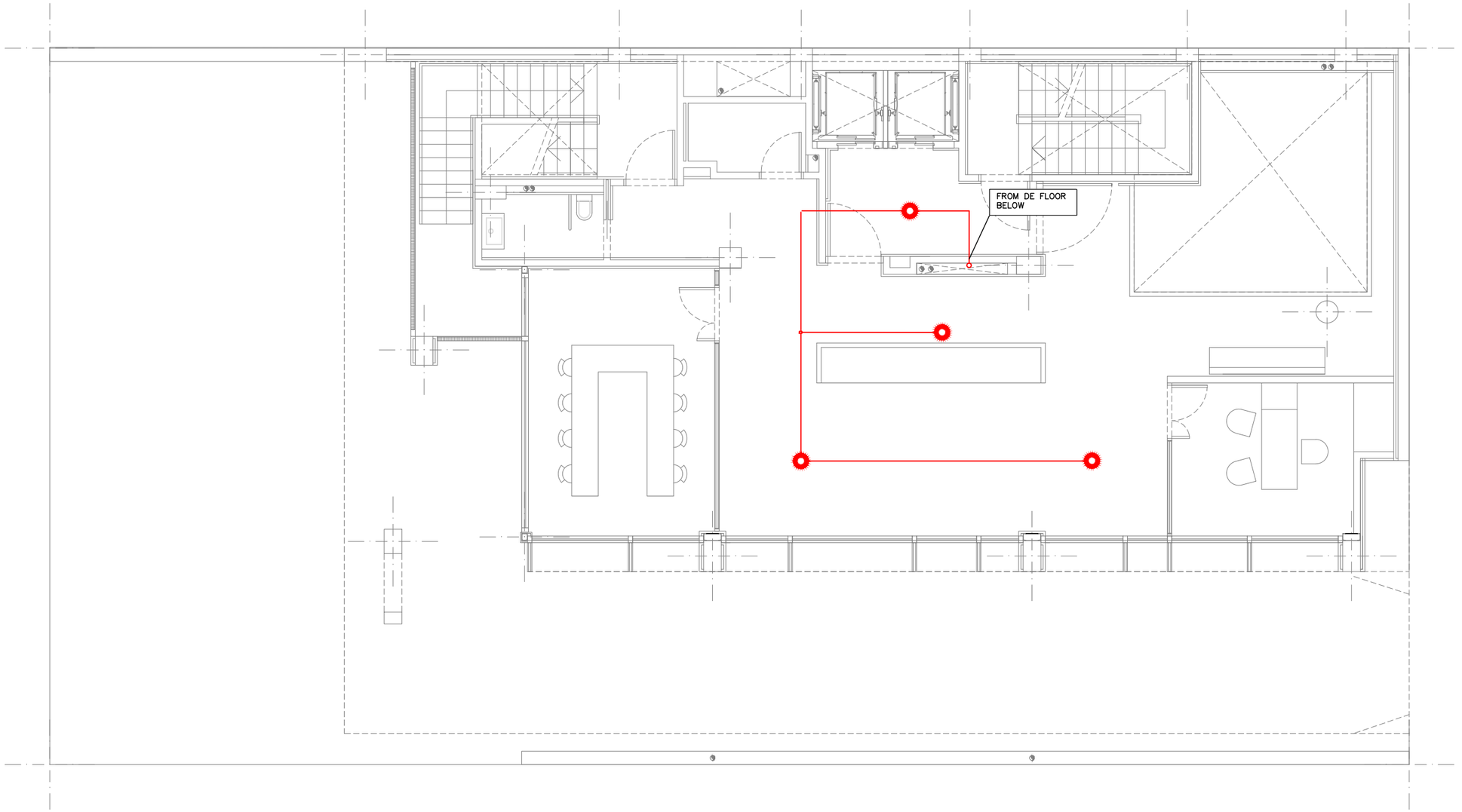
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
MEGAPHONE INSTALLATIONS
GROUND FLOOR

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IME-01.2A.dwg	IME-01.2A



LEGEND

- SPEAKER
- CEILING SPEAKER
- MEGAPHONY LINE
- WARDROBE RACK OF MEGAPHONE
- ADVERTISEMENT DESK

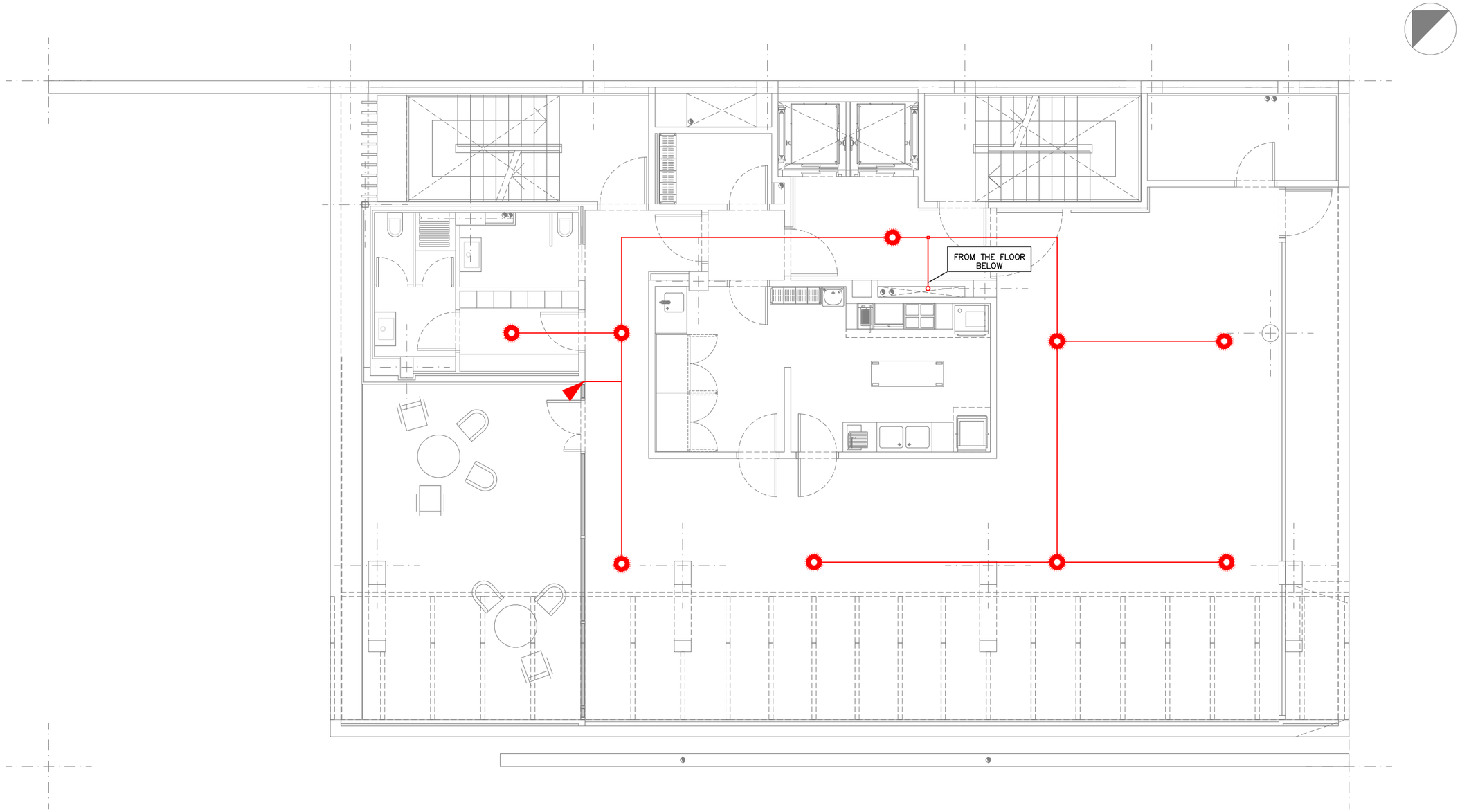
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
MEGAPHONE INSTALLATIONS
FLOOR 1

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IME-01.3A.dwg	IME-01.3A



LEGEND

- SPEAKER
- CEILING SPEAKER
- MEGAPHONY LINE
- WARDROBE RACK OF MEGAPHONE
- ADVERTISEMENT DESK

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO,
RACUNALNISTVO IN INFORMATIKO

PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

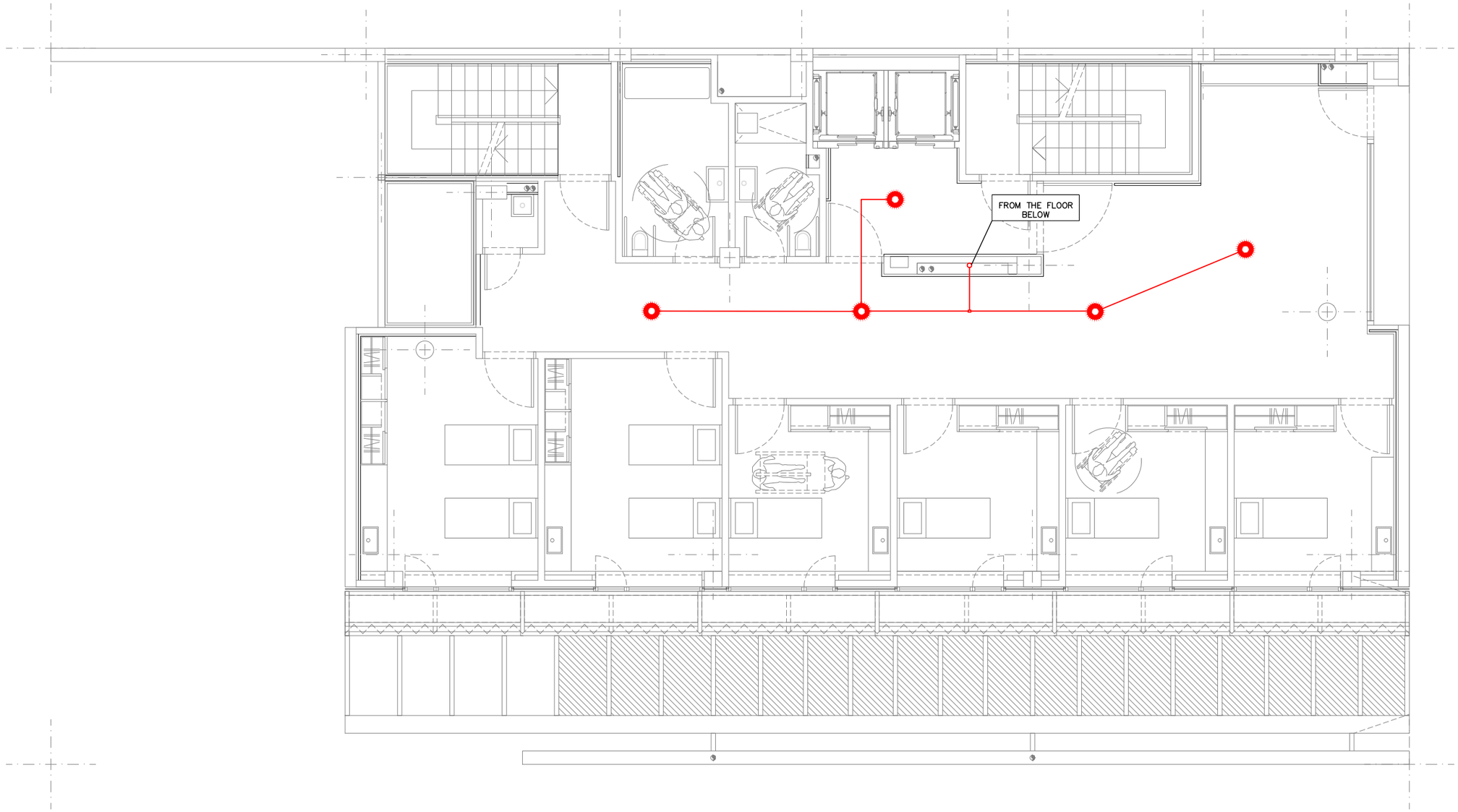
PLAN:

MEGAPHONE INSTALLATIONS
FLOOR 2

AUTHOR:

ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IME-01.4A.dwg	IME-01.4A



LEGEND

- SPEAKER
- CEILING SPEAKER
- MEGAPHONY LINE
- WARDROBE RACK OF MEGAPHONE
- ADVERTISEMENT DESK

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

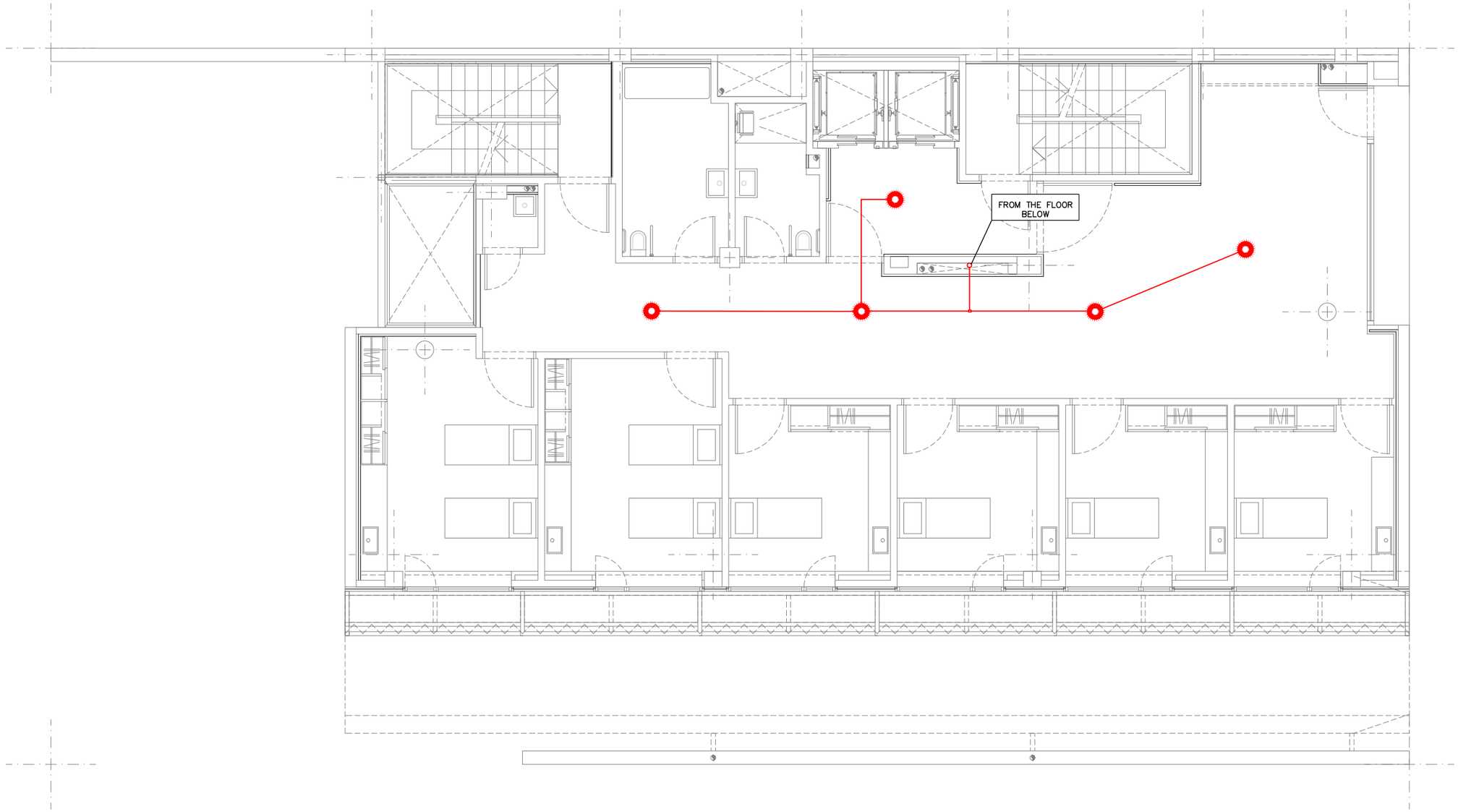
PLAN:

MEGAPHONE INSTALLATIONS
FLOOR 3

AUTHOR:

ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IME-01.5A.dwg	IME-01.5A



LEGEND

- SPEAKER
- CEILING SPEAKER
- MEGAPHONY LINE
- WARDROBE RACK OF MEGAPHONE
- ADVERTISEMENT DESK

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:

MEGAPHONE INSTALLATIONS
FLOORS 4 AND 5

AUTHOR:

ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
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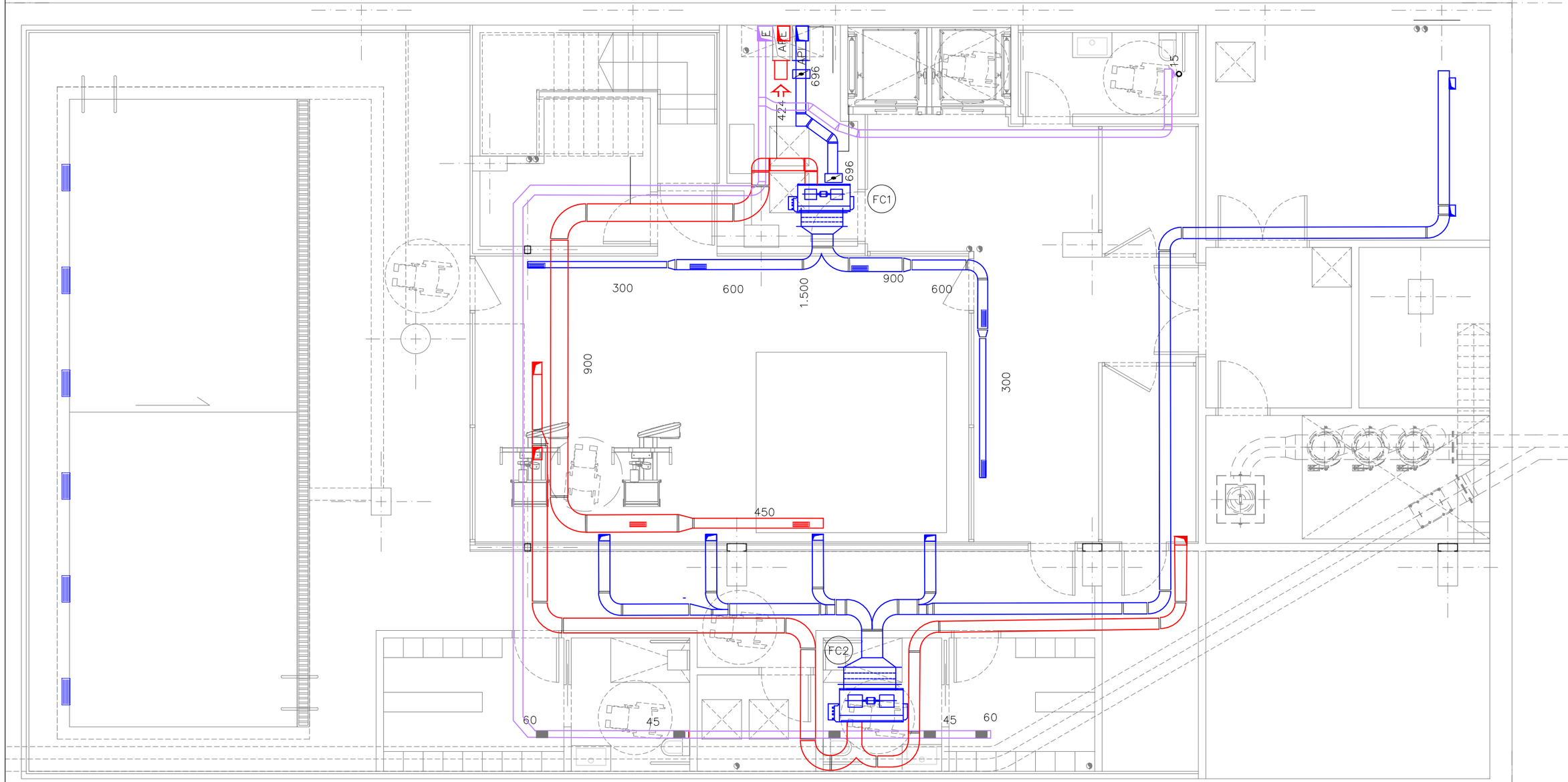

LEGEND

- REGULAR CONDUCT OF ELECTROPLATING SHEET METAL (EXTRACTION)
- VERTICAL STRETCH EXTRACTION CONDUCT
- GRILL OF IMPULSION
- GRILL OF RETORN
- GRILL OF IMPULSION
- GRILL OF RETORN
- REGULAR CONDUCT OF ELECTROPLATING SHEET METAL (IMPULSION).
- VERTICAL STRETCH IMPULSION CONDUCT
- FLEXIBLE CONDUCT
- FANCOIL
- CIRCULAR ELECTROPLATING STEEL SHEET

OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS AND RELATED DISABILITIES

PLAN:
AIR CONDITIONING INSTALLATIONS
UNDERGROUND FLOOR

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
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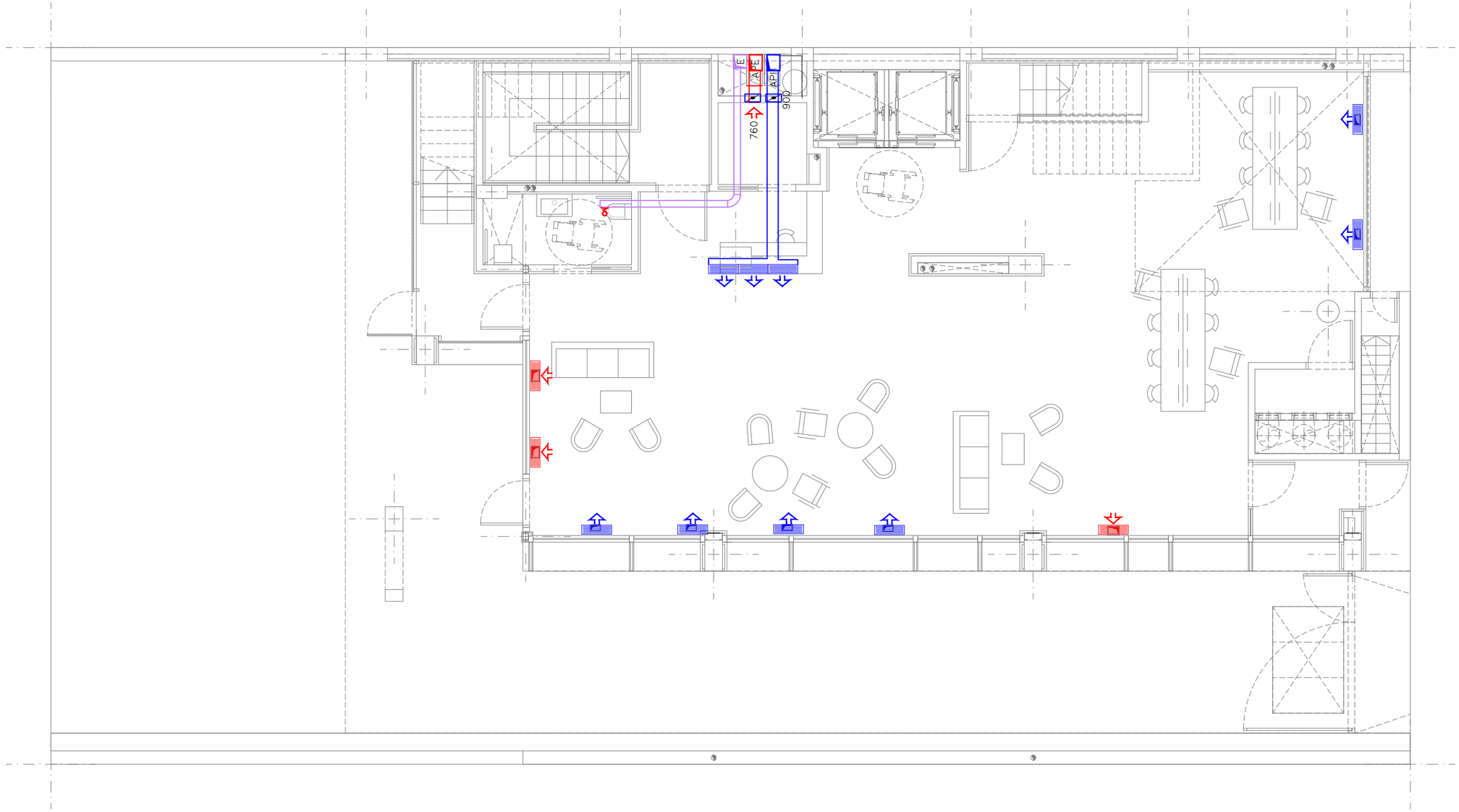

LEGEND

REGULAR CONDUCT OF ELECTROPLATING SHEET METAL (EXTRACTION)	REGULAR CONDUCT OF ELECTROPLATING SHEET METAL (IMPULSION).
VERTICAL STRETCH EXTRACTION CONDUCT	VERTICAL STRETCH IMPULSION CONDUCT
GRILL OF IMPULSION	FLEXIBLE CONDUCT
GRILL OF RETORN	FANCOIL
GRILL OF IMPULSION	CIRCULAR ELECTROPLATING STEEL SHEET
GRILL OF RETORN	

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

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AND RELATED DISABILITIES

PLAN:

AIR CONDITIONING INSTALLATIONS
GROUND FLOOR

AUTHOR:

ANA GONZÁLEZ PUEYO

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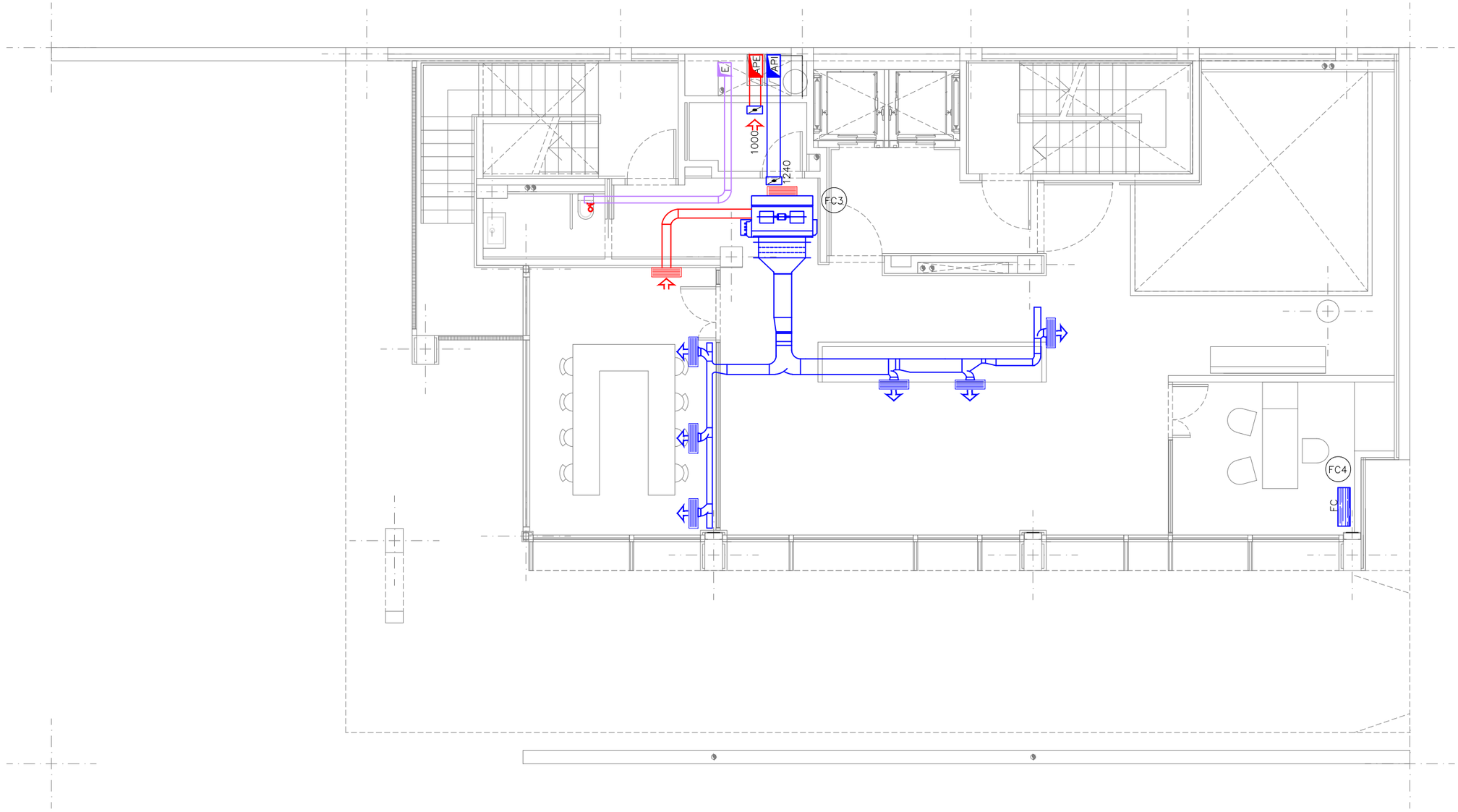

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REGULAR CONDUCT OF ELECTROPLATING SHEET METAL (EXTRACTION)	REGULAR CONDUCT OF ELECTROPLATING SHEET METAL (IMPULSION).
VERTICAL STRETCH EXTRACTION CONDUCT	VERTICAL STRETCH IMPULSION CONDUCT
GRILL OF IMPULSION	FLEXIBLE CONDUCT
GRILL OF RETORN	FANCOIL
GRILL OF IMPULSION	CIRCULAR ELECTROPLATING STEEL SHEET
GRILL OF RETORN	

OWNER:

UNIVERZA V MARIBORU
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PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:

AIR CONDITIONING INSTALLATIONS
FLOOR 1

AUTHOR:
ANA GONZÁLEZ PUEYO

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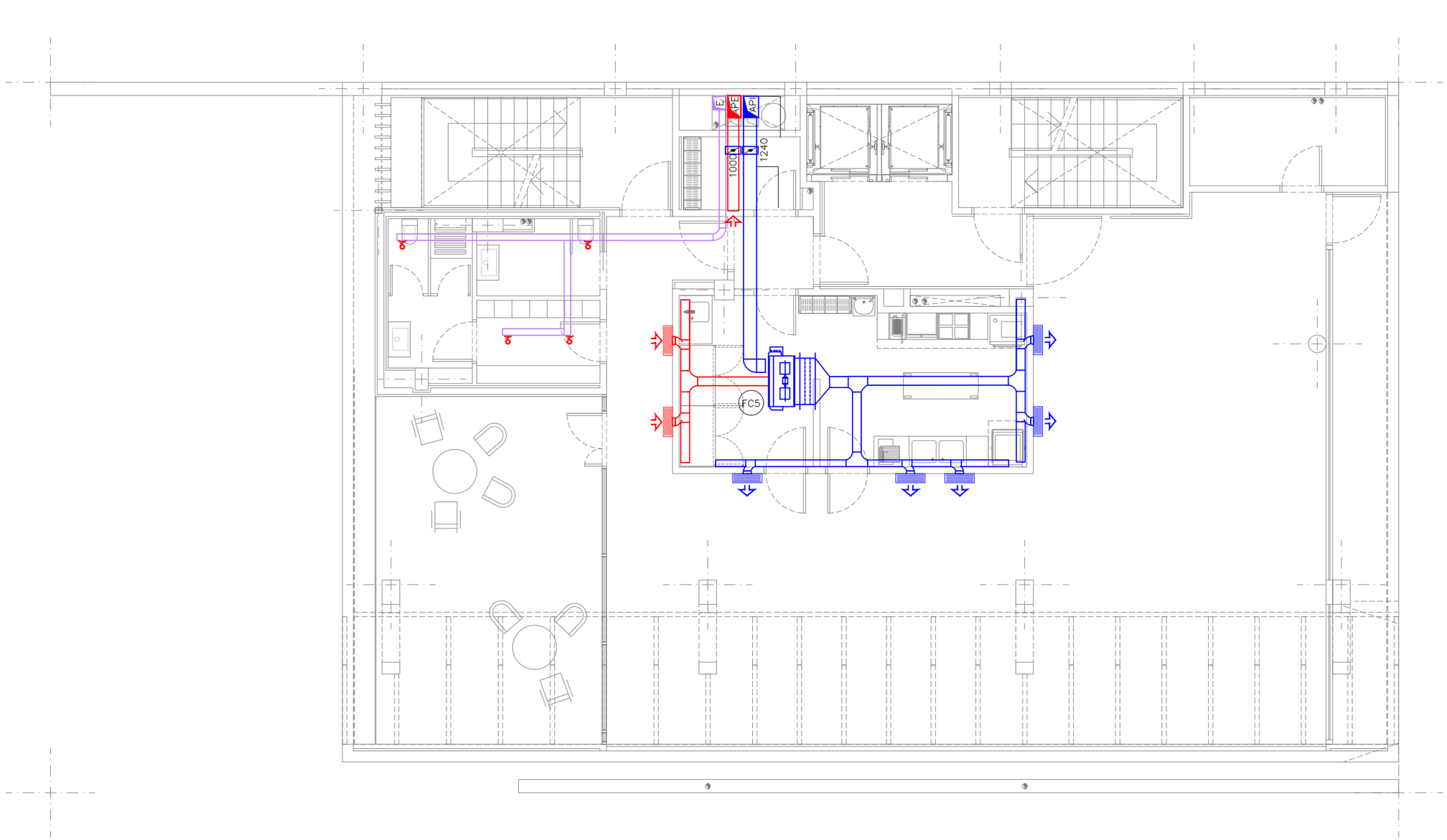

LEGEND

- REGULAR CONDUCT OF ELECTROPLATING SHEET METAL (EXTRACTION)
- VERTICAL STRETCH EXTRACTION CONDUCT
- GRILL OF IMPULSION
- GRILL OF RETORN
- GRILL OF IMPULSION
- GRILL OF RETORN
- REGULAR CONDUCT OF ELECTROPLATING SHEET METAL (IMPULSION).
- VERTICAL STRETCH IMPULSION CONDUCT
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- CIRCULAR ELECTROPLATING STEEL SHEET

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:

AIR CONDITIONING INSTALLATIONS
FLOOR 2

AUTHOR:

ANA GONZÁLEZ PUEYO

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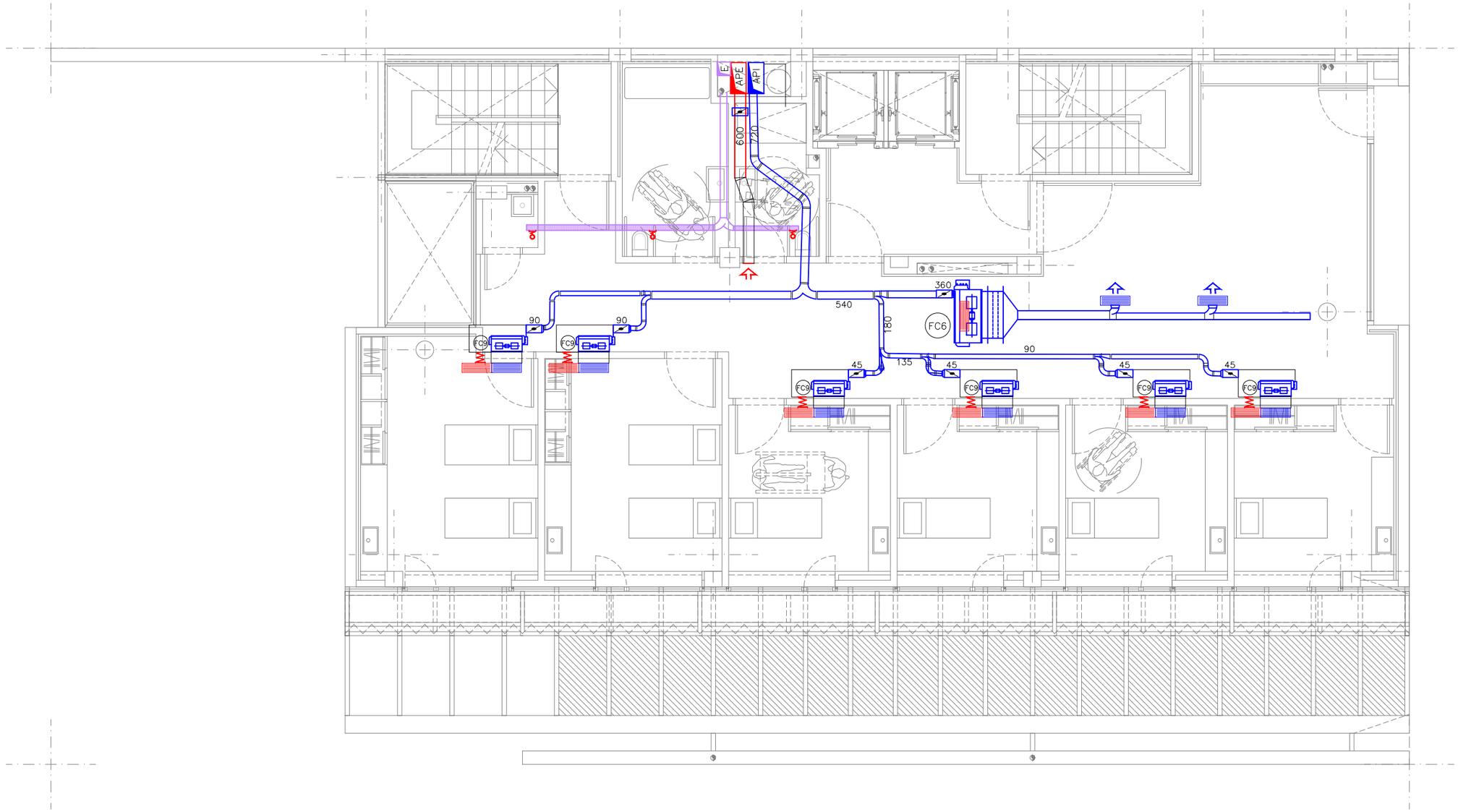

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REGULAR CONDUCT OF ELECTROPLATING SHEET METAL (EXTRACTION)	REGULAR CONDUCT OF ELECTROPLATING SHEET METAL (IMPULSION).
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GRILL OF IMPULSION	FLEXIBLE CONDUCT
GRILL OF RETORN	FANCOIL
GRILL OF IMPULSION	CIRCULAR ELECTROPLATING STEEL SHEET
GRILL OF RETORN	

OWNER:

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PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:

AIR CONDITIONING INSTALLATIONS
FLOOR 3

AUTHOR:

ANA GONZÁLEZ PUEYO

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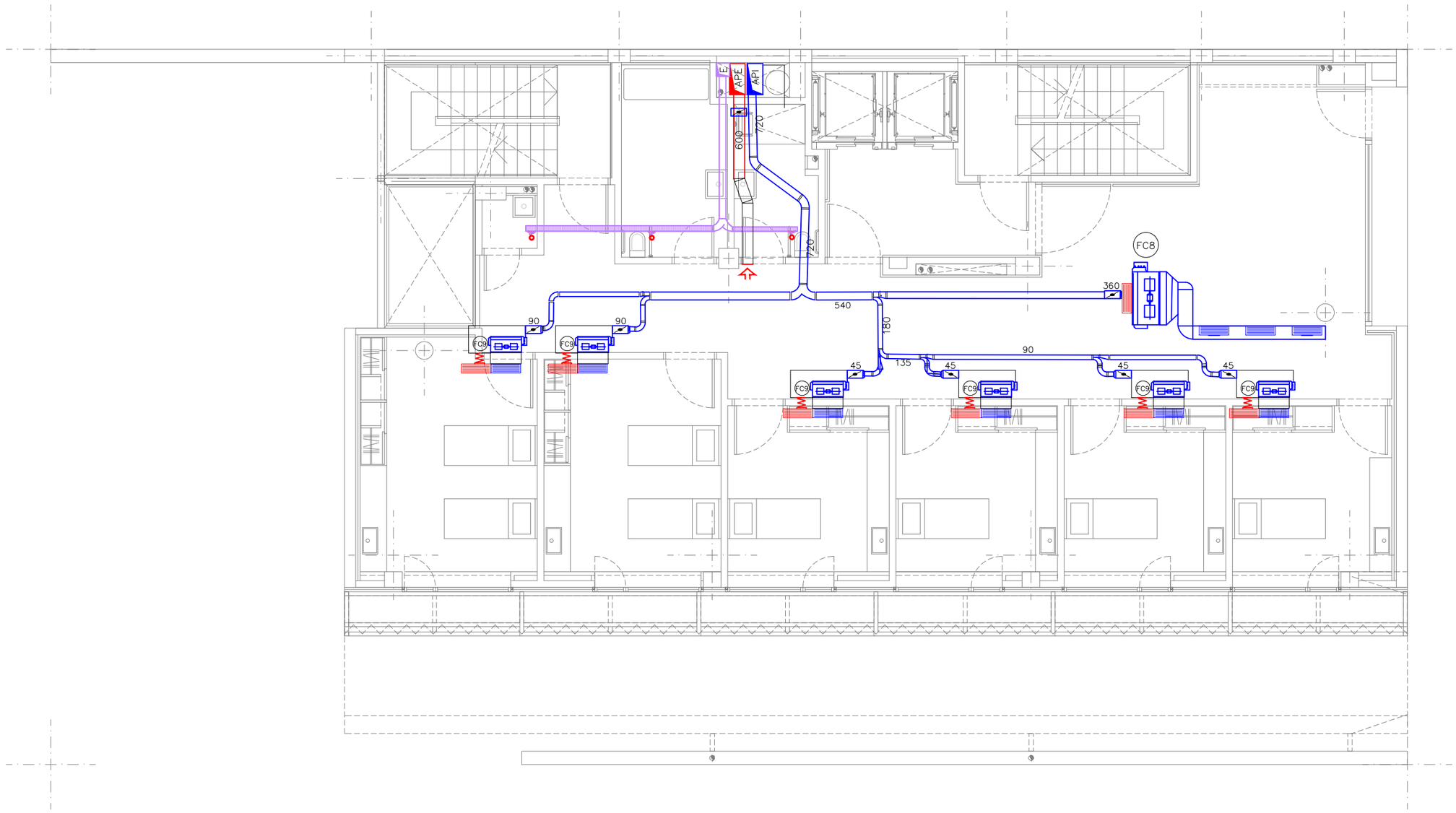

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REGULAR CONDUCT OF ELECTROPLATING SHEET METAL (EXTRACTION)	REGULAR CONDUCT OF ELECTROPLATING SHEET METAL (IMPULSION).
VERTICAL STRETCH EXTRACTION CONDUCT	VERTICAL STRETCH IMPULSION CONDUCT
GRILL OF IMPULSION	FLEXIBLE CONDUCT
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GRILL OF IMPULSION	CIRCULAR ELECTROPLATING STEEL SHEET
GRILL OF RETORN	

OWNER:
UNIVERZA V MARIBORU
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PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
AIR CONDITIONING INSTALLATIONS
FLOORS 4 AND 5

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
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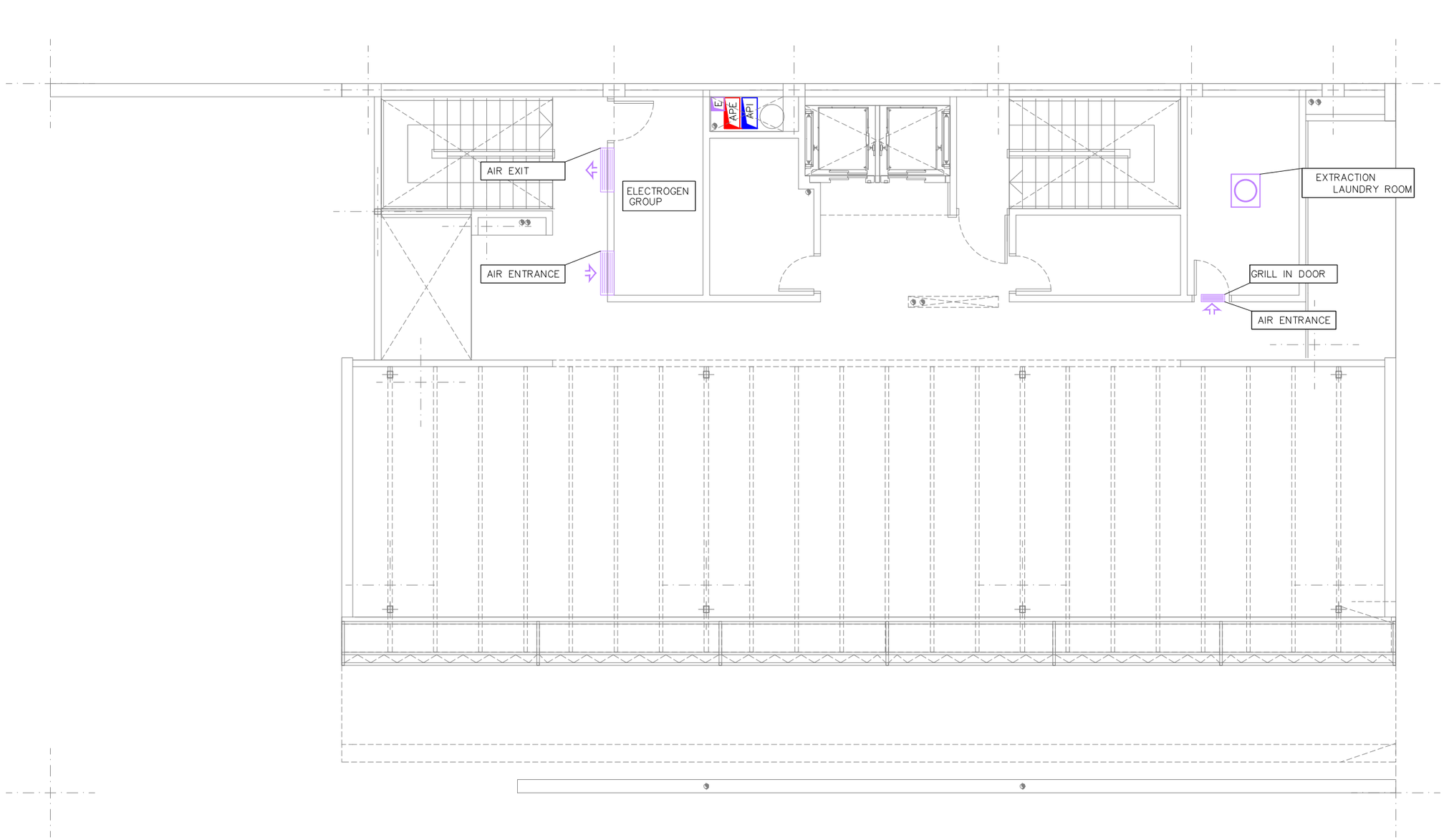

LEGEND

- REGULAR CONDUCT OF ELECTROPLATING SHEET METAL (EXTRACTION)
- VERTICAL STRETCH EXTRACTION CONDUCT
- GRILL OF IMPULSION
- GRILL OF RETORN
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- FLEXIBLE CONDUCT
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OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
AIR CONDITIONING INSTALLATIONS
FLOOR 6

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
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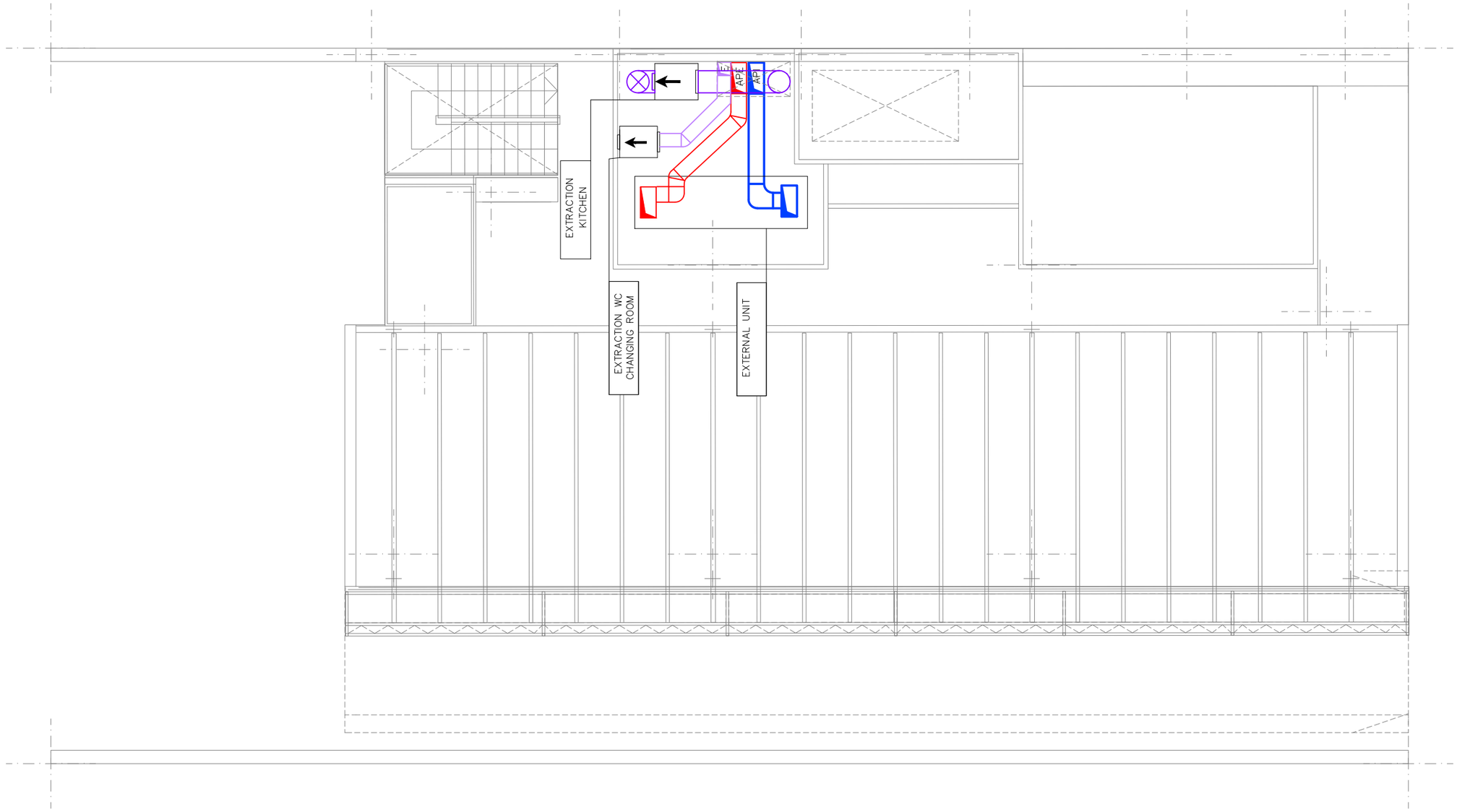

LEGEND

- REGULAR CONDUCT OF ELECTROPLATING SHEET METAL (EXTRACTION)
- VERTICAL STRETCH EXTRACTION CONDUCT
- GRILL OF IMPULSION
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- FLEXIBLE CONDUCT
- FANCOIL
- CIRCULAR ELECTROPLATING STEEL SHEET

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:

AIR CONDITIONING INSTALLATIONS
COVERED FLOOR

AUTHOR:

ANA GONZÁLEZ PUEYO

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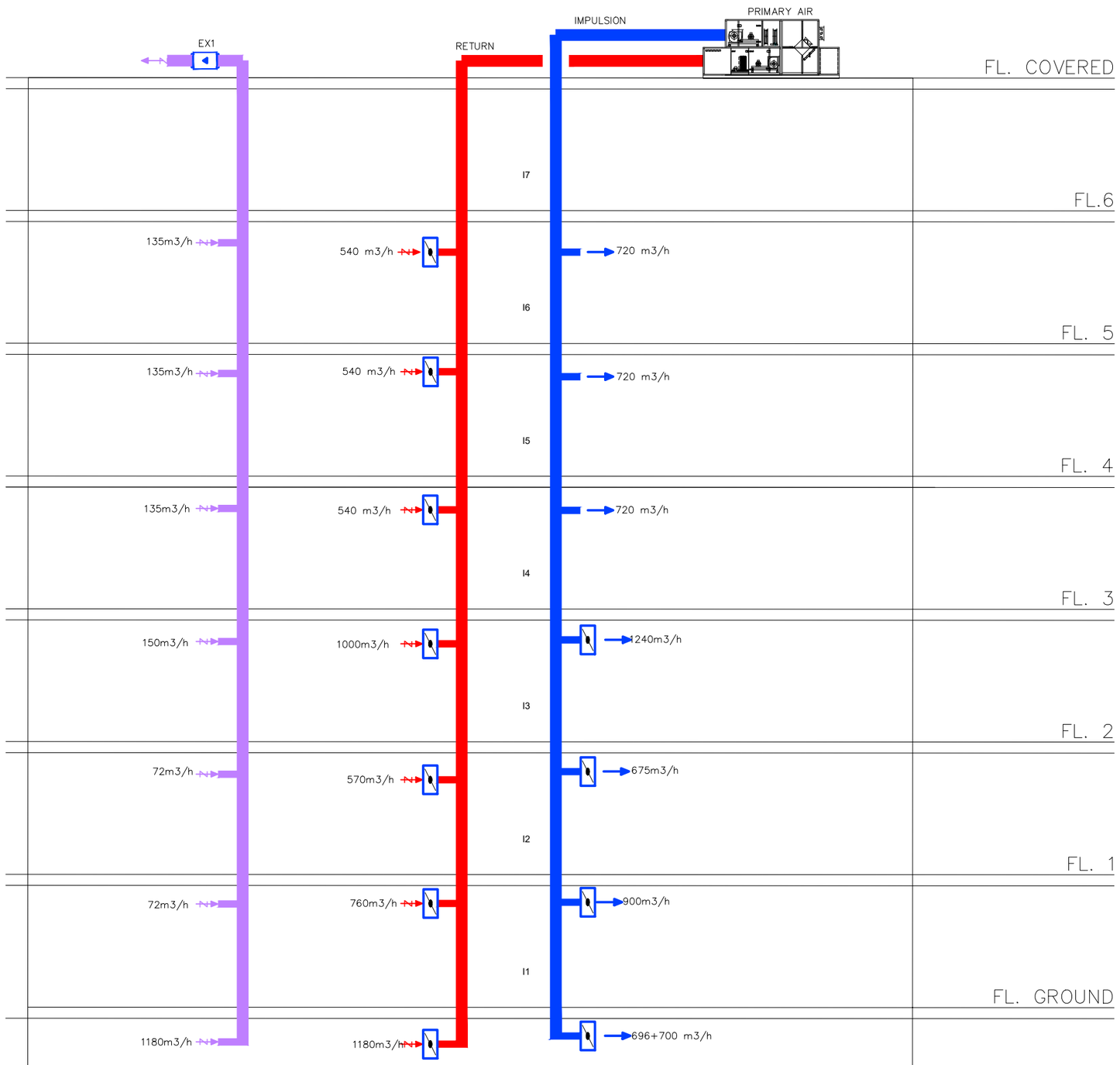

OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RAČUNALNIŠTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
AIR CONDITIONING INSTALLATIONS
AIR VERTICAL SCHEME

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
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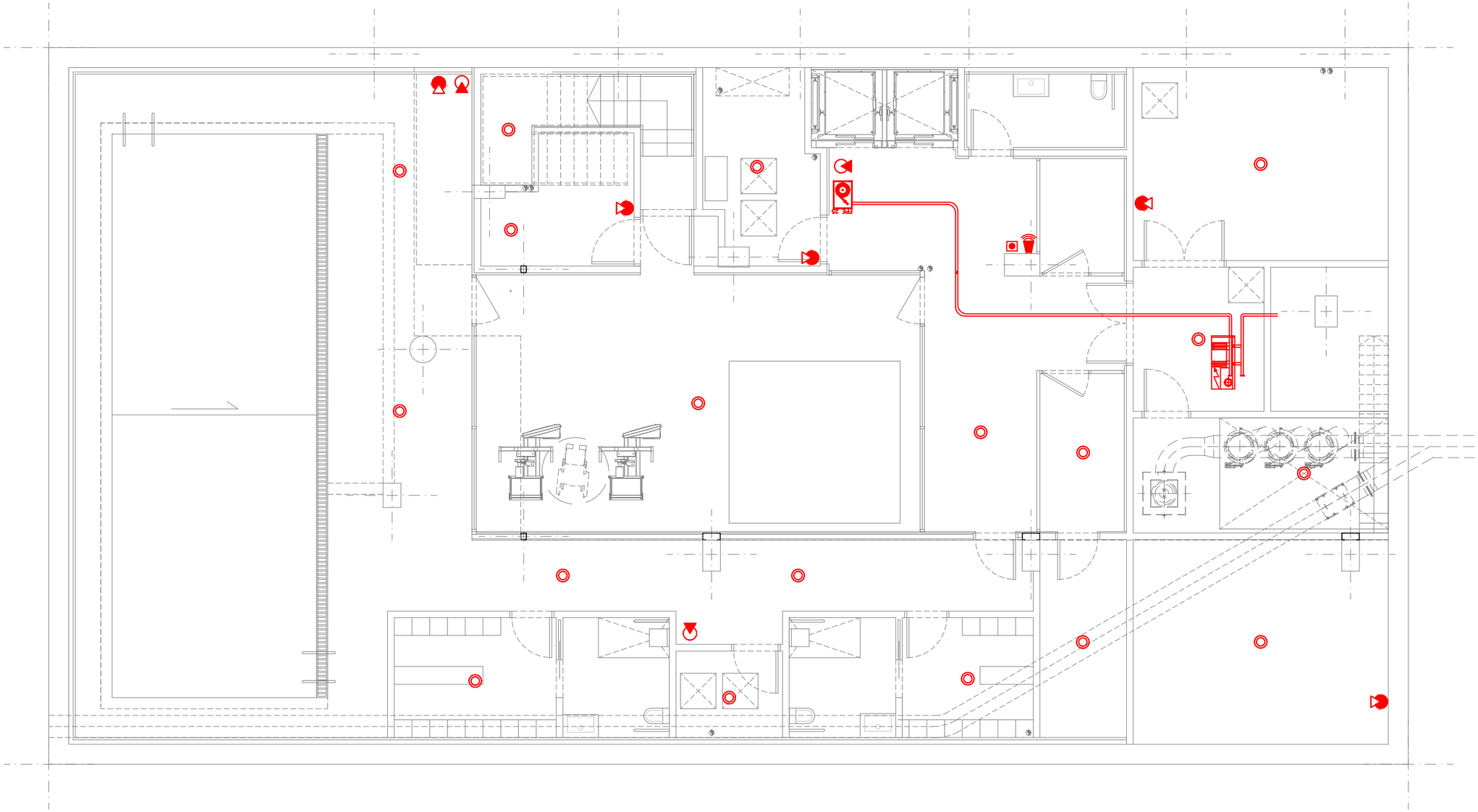

LEGEND

STEEL TUBE DIN 2440 BLACK CLASS	PORTABLE DUST EXTINGUER OF ABC POWDERS
FIRE–PLACE EQUIPPED ø 25 mm.	PORTABLE FIRE EXTINGUISHER OF CO2
SIREN	CUT OFF VALVE
ANALOGIC OPTIC DETECTOR	ANTI–RETURN VALVE
ALARM BUTTON FIRES	BOY OF LEVEL
FLOAT VALVE	SCRAPYARD
COUNTER	PUMP
IPF–41	DRY COLUMN UPRIGHT
IPF–39	FILTER
PRESSURE GROUP FIRE PROTECTION	

NOTE: THE CONNECTIONS WITH THE FPE WILL BE CARRIED OUT WITH BLACK STEEL PIPE DIN 2440 BLACK CLASS OF ø 1

OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
FIRE PROTECTION INSTALLATIONS
UNDERGROUND FLOOR

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
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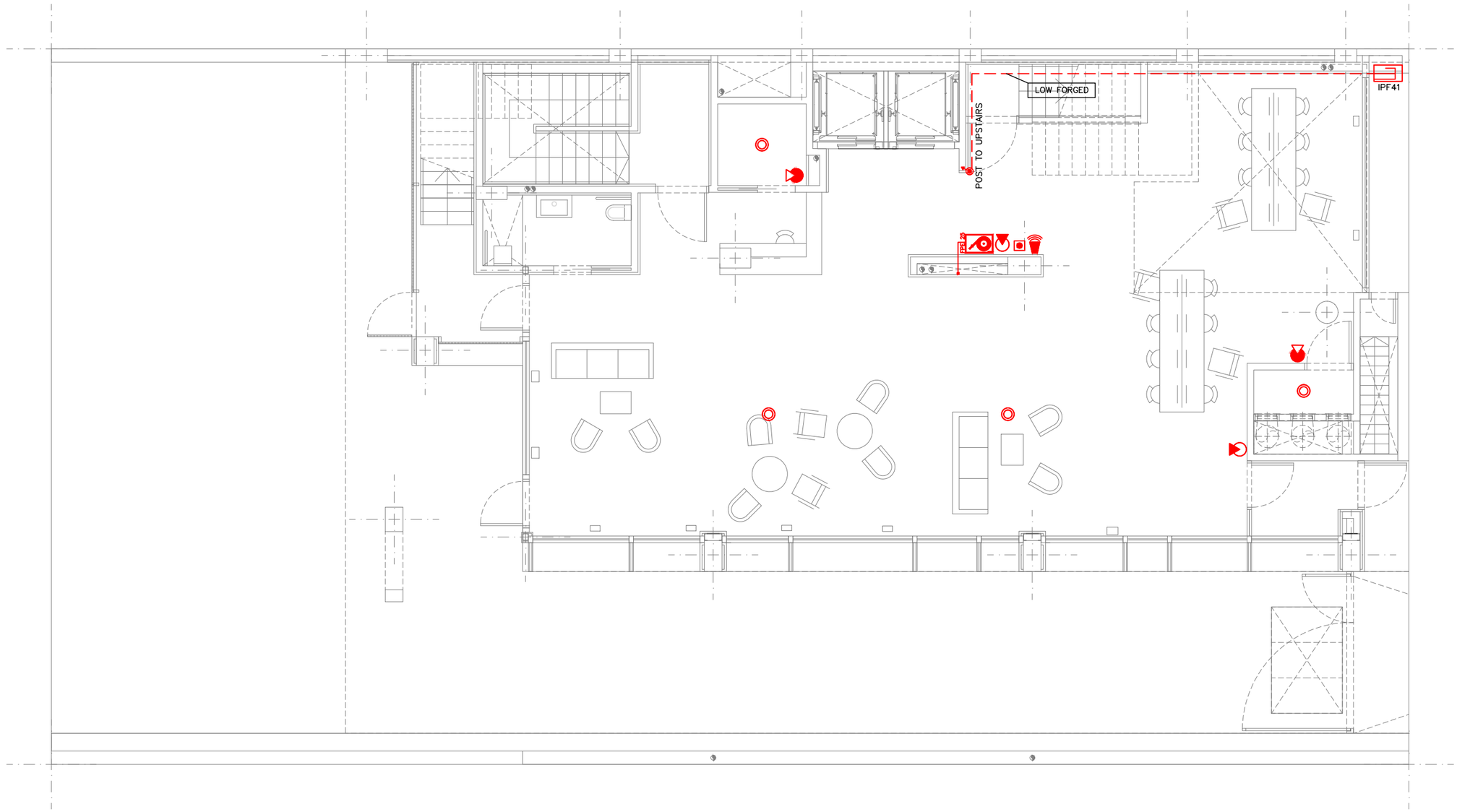

LEGEND

STEEL TUBE DIN 2440 BLACK CLASS	PORTABLE DUST EXTINGUER OF ABC POWDERS
FIRE–PLACE EQUIPPED ø 25 mm.	PORTABLE FIRE EXTINGUISHER OF CO2
SIREN	CUT OFF VALVE
ANALOGIC OPTIC DETECTOR	ANTI–RETURN VALVE
ALARM BUTTON FIRES	BOY OF LEVEL
FLOAT VALVE	SCRAPYARD
COUNTER	PUMP
IPF–41	DRY COLUMN UPRIGHT
IPF–39	FILTER
PRESSURE GROUP FIRE PROTECTION	

NOTE: THE CONNECTIONS WITH THE FPE WILL BE CARRIED OUT WITH BLACK STEEL PIPE DIN 2440 BLACK CLASS OF ø 1

OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
FIRE PROTECTION INSTALLATIONS
GROUND FLOOR

AUTHOR:
ANA GONZÁLEZ PUEYO

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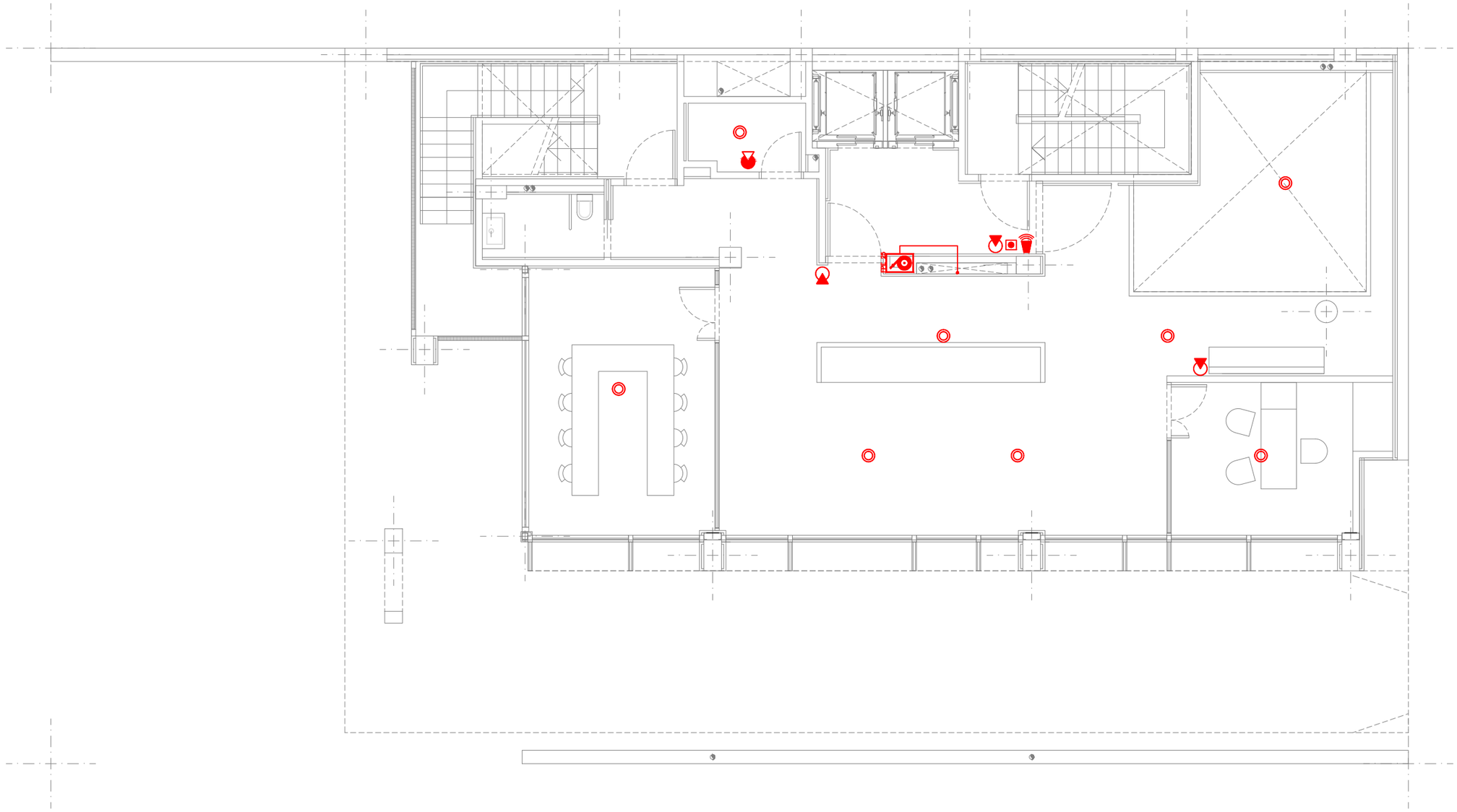

LEGEND

STEEL TUBE DIN 2440 BLACK CLASS	PORTABLE DUST EXTINGUER OF ABC POWDERS
FIRE–PLACE EQUIPPED ø 25 mm.	PORTABLE FIRE EXTINGUISHER OF CO2
SIREN	CUT OFF VALVE
ANALOGIC OPTIC DETECTOR	ANTI–RETURN VALVE
ALARM BUTTON FIRES	BOY OF LEVEL
FLOAT VALVE	SCRAPYARD
COUNTER	PUMP
IPF–41	DRY COLUMN UPRIGHT
IPF–39	FILTER
PRESSURE GROUP FIRE PROTECTION	

NOTE: THE CONNECTIONS WITH THE FPE WILL BE CARRIED OUT WITH BLACK STEEL PIPE DIN 2440 BLACK CLASS OF ø 1

OWNER:
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DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
FIRE PROTECTION INSTALLATIONS
FLOOR 1

AUTHOR:
ANA GONZÁLEZ PUEYO

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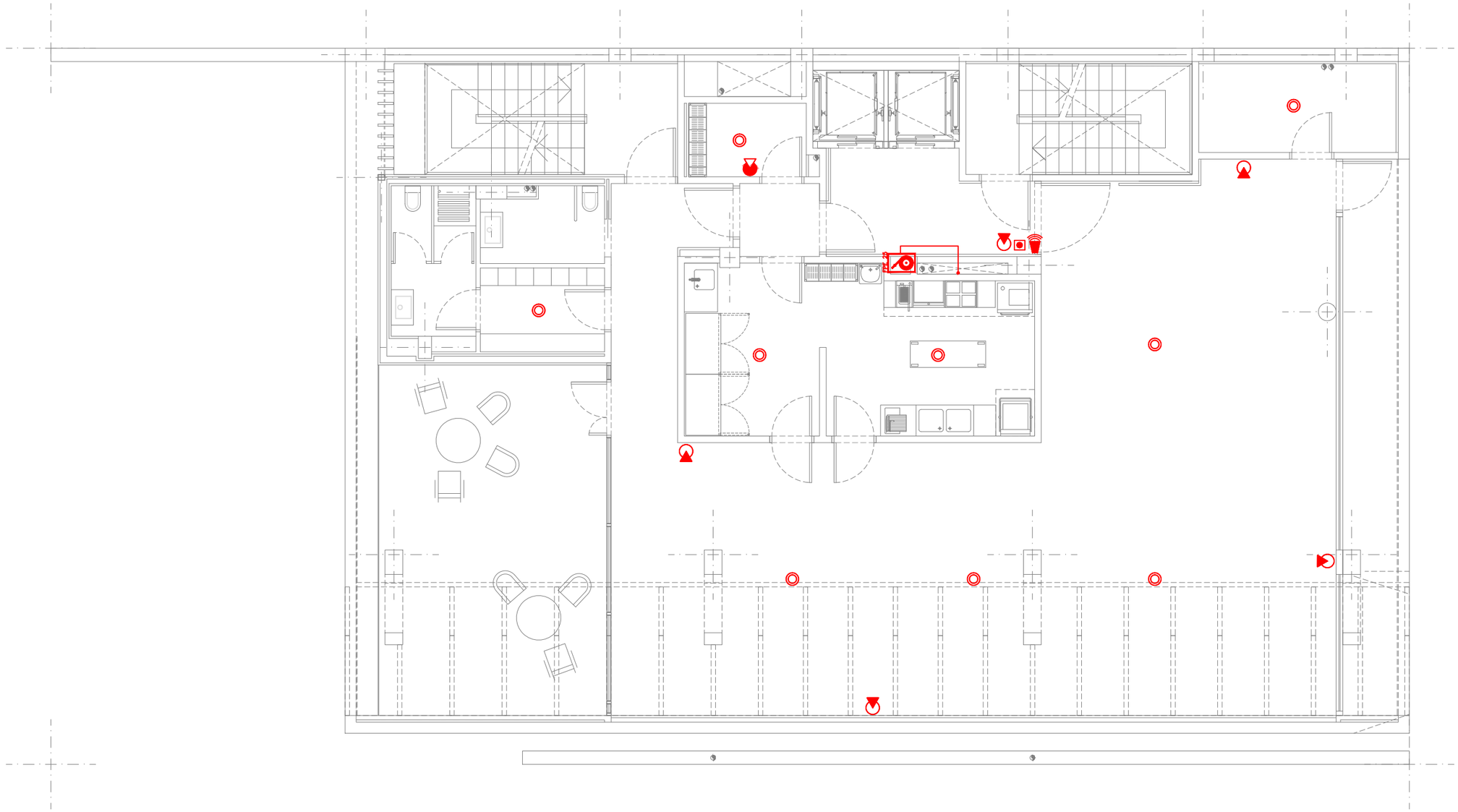

LEGEND

STEEL TUBE DIN 2440 BLACK CLASS	PORTABLE DUST EXTINGUER OF ABC POWDERS
FIRE–PLACE EQUIPPED ø 25 mm.	PORTABLE FIRE EXTINGUISHER OF CO2
SIREN	CUT OFF VALVE
ANALOGIC OPTIC DETECTOR	ANTI–RETURN VALVE
ALARM BUTTON FIRES	BOY OF LEVEL
FLOAT VALVE	SCRAPYARD
COUNTER	PUMP
IPF–41	DRY COLUMN UPRIGHT
IPF–39	FILTER
PRESSURE GROUP FIRE PROTECTION	

NOTE: THE CONNECTIONS WITH THE FPE WILL BE CARRIED OUT WITH BLACK STEEL PIPE DIN 2440 BLACK CLASS OF ø 1

OWNER:

UNIVERZA V MARIBORU
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PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:

FIRE PROTECTION INSTALLATIONS
FLOOR 2

SCALE:	DATE:	FILE	No. PLAN:
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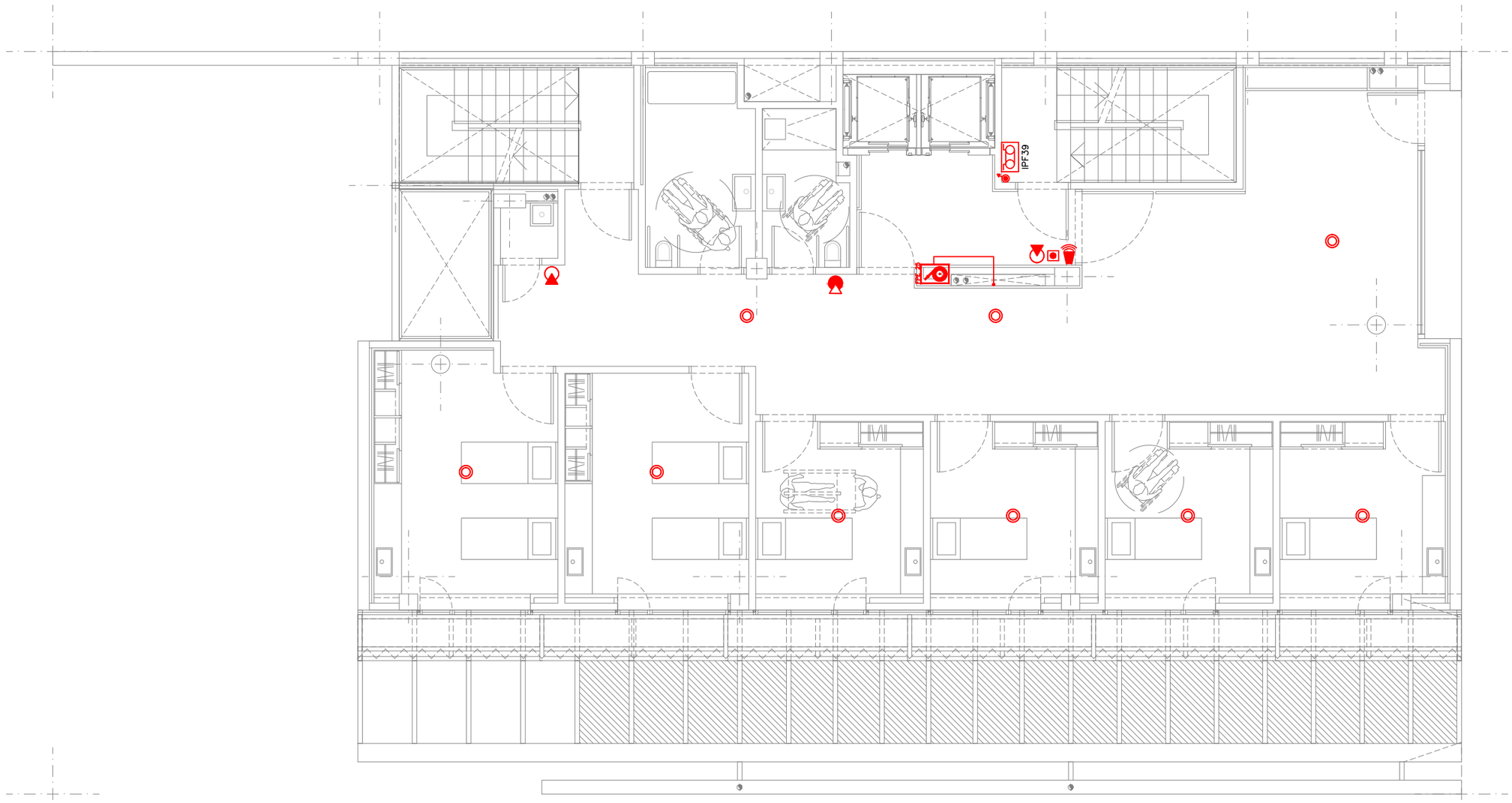
AUTHOR:

ANA GONZÁLEZ PUEYO



LEGEND

STEEL TUBE DIN 2440 BLACK CLASS	PORTABLE DUST EXTINGUER OF ABC POWDERS
FIRE–PLACE EQUIPPED ø 25 mm.	PORTABLE FIRE EXTINGUISHER OF CO2
SIREN	CUT OFF VALVE
ANALOGIC OPTIC DETECTOR	ANTI–RETURN VALVE
ALARM BUTTON FIRES	BOY OF LEVEL
FLOAT VALVE	SCRAPYARD
COUNTER	PUMP
IPF–41	DRY COLUMN UPRIGHT
IPF–39	FILTER
PRESSURE GROUP FIRE PROTECTION	

NOTE: THE CONNECTIONS WITH THE FPE WILL BE CARRIED OUT WITH BLACK STEEL PIPE DIN 2440 BLACK CLASS OF ø 1

OWNER:
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PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
FIRE PROTECTION INSTALLATIONS
FLOOR 3

AUTHOR:
ANA GONZÁLEZ PUEYO

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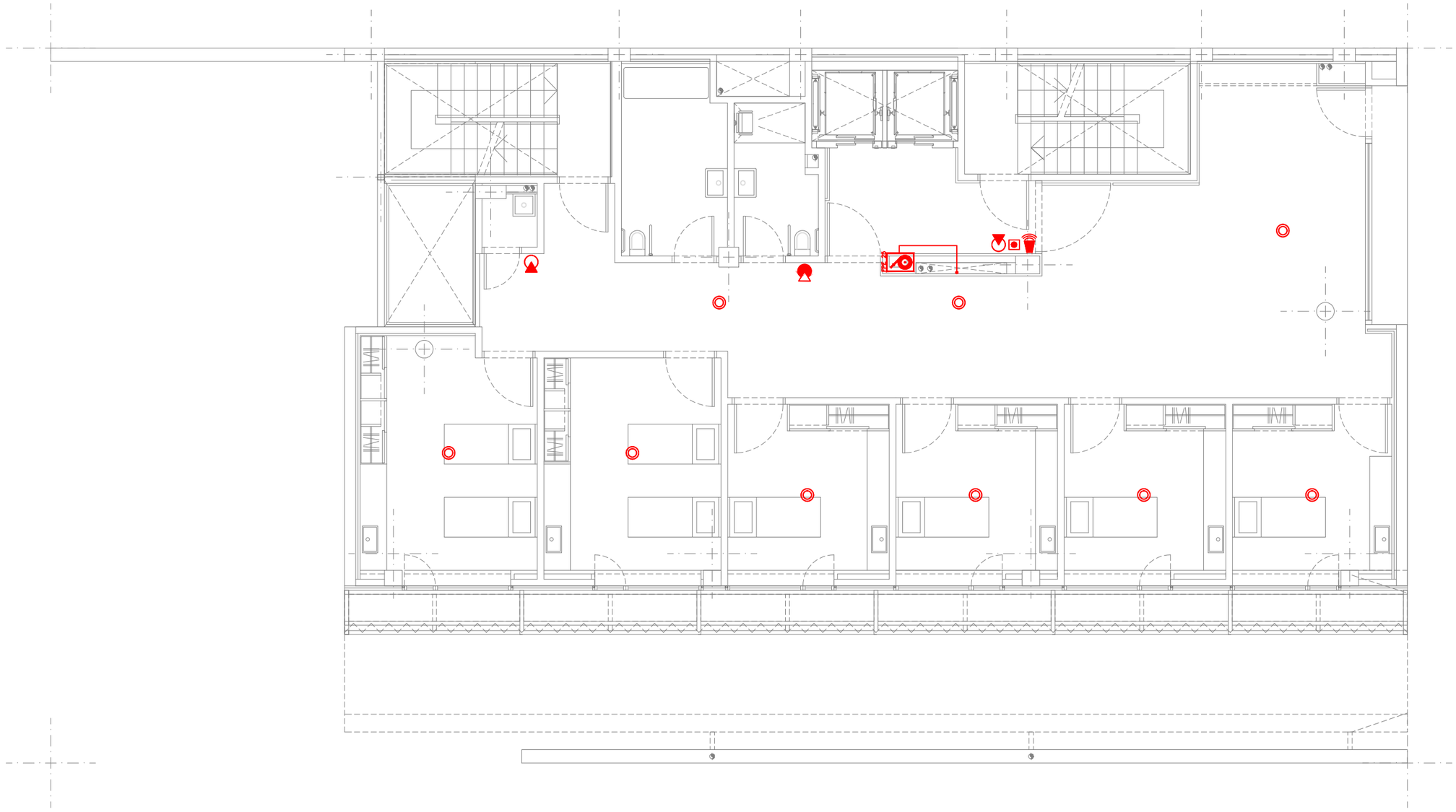

LEGEND

STEEL TUBE DIN 2440 BLACK CLASS	PORTABLE DUST EXTINGUER OF ABC POWDERS
FIRE–PLACE EQUIPPED ø 25 mm.	PORTABLE FIRE EXTINGUISHER OF CO2
SIREN	CUT OFF VALVE
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ALARM BUTTON FIRES	BOY OF LEVEL
FLOAT VALVE	SCRAPYARD
COUNTER	PUMP
IPF–41	DRY COLUMN UPRIGHT
IPF–39	FILTER
PRESSURE GROUP FIRE PROTECTION	

NOTE: THE CONNECTIONS WITH THE FPE WILL BE CARRIED OUT WITH BLACK STEEL PIPE DIN 2440 BLACK CLASS OF ø 1

OWNER:
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PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
FIRE PROTECTION INSTALLATIONS
FLOORS 4 AND 5

AUTHOR:
ANA GONZÁLEZ PUEYO

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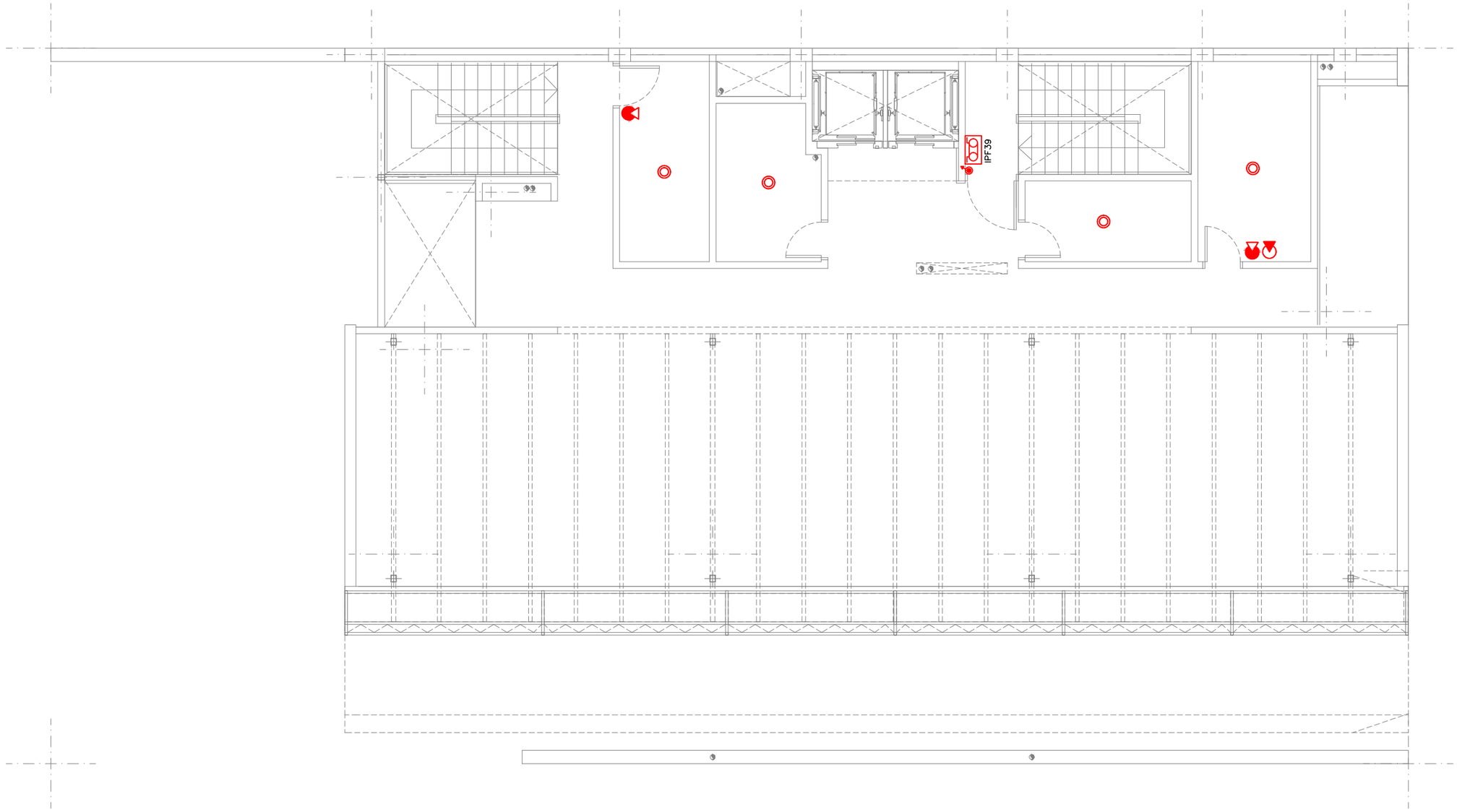

LEGEND

STEEL TUBE DIN 2440 BLACK CLASS	PORTABLE DUST EXTINGUER OF ABC POWDERS
FIRE–PLACE EQUIPPED ø 25 mm.	PORTABLE FIRE EXTINGUISHER OF CO2
SIREN	CUT OFF VALVE
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ALARM BUTTON FIRES	BOY OF LEVEL
FLOAT VALVE	SCRAPYARD
COUNTER	PUMP
IPF–41	DRY COLUMN UPRIGHT
IPF–39	FILTER
PRESSURE GROUP FIRE PROTECTION	

NOTE: THE CONNECTIONS WITH THE FPE WILL BE CARRIED OUT WITH BLACK STEEL PIPE DIN 2440 BLACK CLASS OF ø 1

OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
FIRE PROTECTION INSTALLATIONS
FLOOR 6

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
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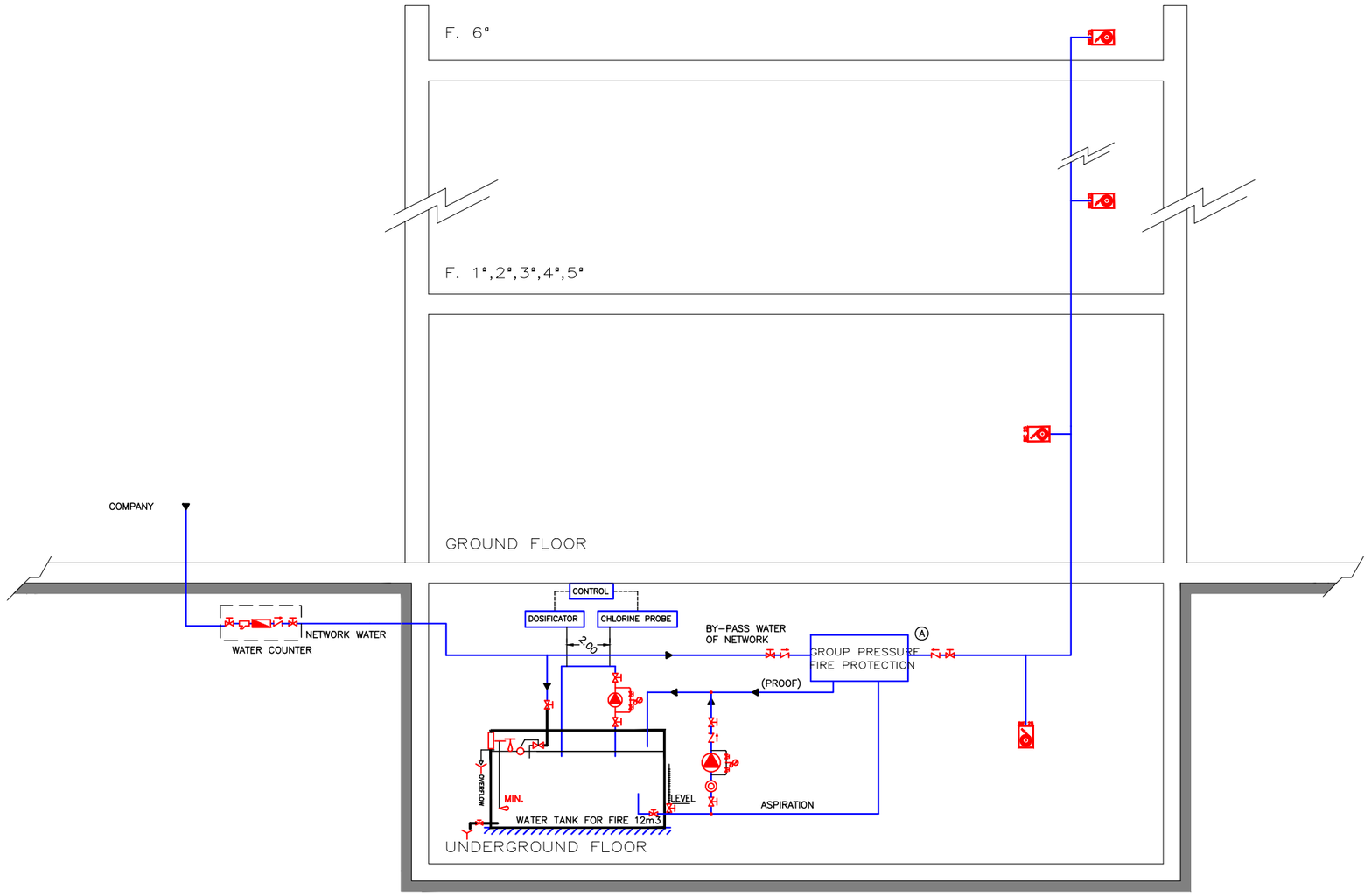

LEGEND

STEEL TUBE DIN 2440 BLACK CLASS	PORTABLE DUST EXTINGUER OF ABC POWDERS
FIRE-PLACE EQUIPPED ø 25 mm.	PORTABLE FIRE EXTINGUISHER OF CO2
SIREN	CUT OFF VALVE
ANALOGIC OPTIC DETECTOR	ANTI-RETURN VALVE
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FLOAT VALVE	SCRAPYARD
COUNTER	PUMP
IPF-41	DRY COLUMN UPRIGHT
IPF-39	FILTER
PRESSURE GROUP FIRE PROTECTION	

NOTE: THE CONNECTIONS WITH THE FPE WILL BE CARRIED OUT WITH BLACK STEEL PIPE DIN 2440 BLACK CLASS OF ø 1

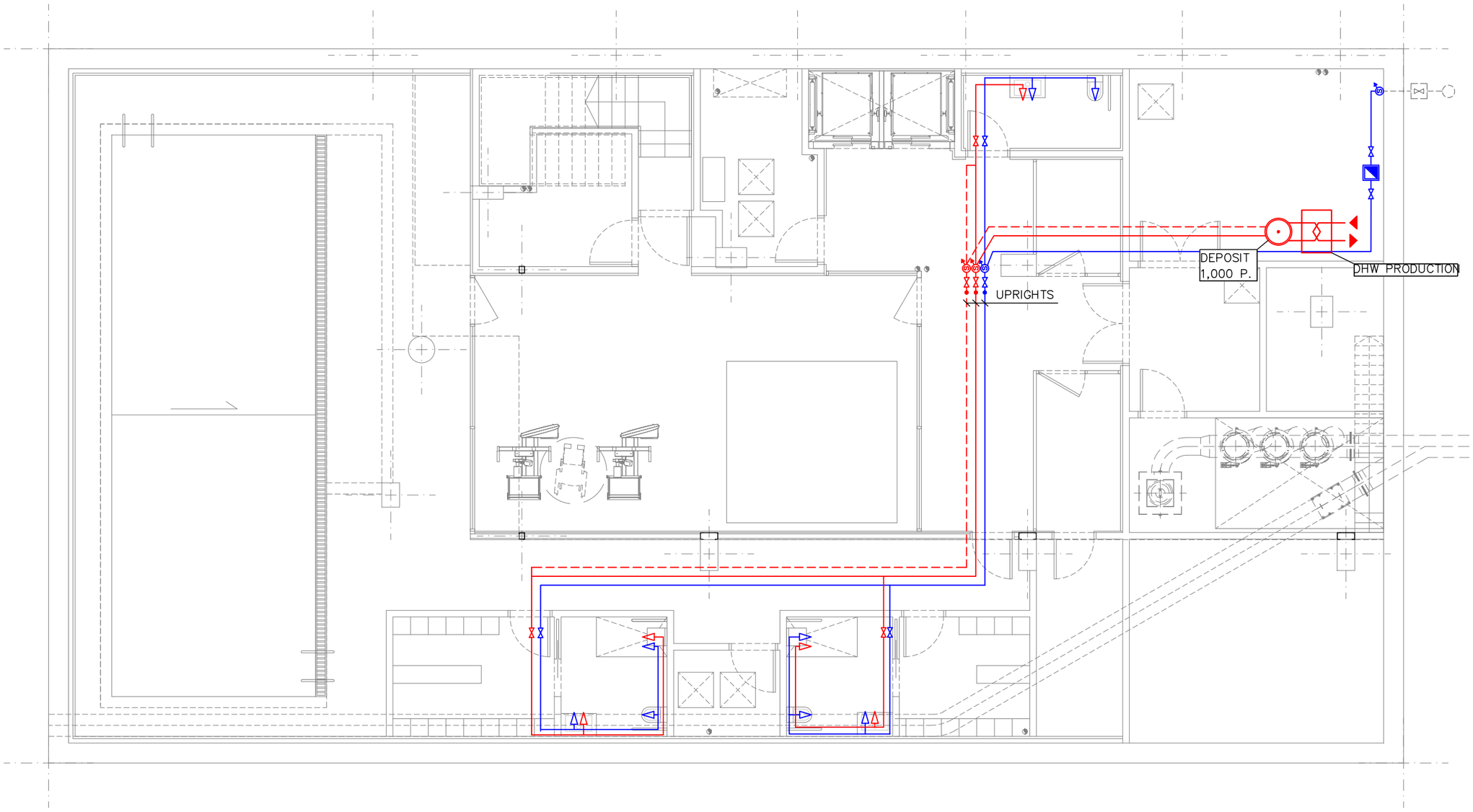
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
PRINCIPLE SCHEME
FIRE PROTECTION INSTALLATIONS

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-ICI-01.8A.dwg	ICI-01.8A



LEGEND

- GENERAL NETWORK OF PLUMBING
- FEED TUBE
- INTERIOR PLUMBING NETWORK OF COLD WATER (PEX TUBES)
- INTERIOR PLUMBING NETWORK OF HOT WATER (PEX TUBES)
- SEAT VALVE OF COLD WATER
- SEAT VALVE OF HOT WATER
- KEY OF COLD WATER
- KEY OF HOT WATER
- UPRIGHT COLD WATER
- UPRIGHT DHW
- COUNTER
- SUPPLY CONNECTION CATCH BASIN

OWNER:

UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:

DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

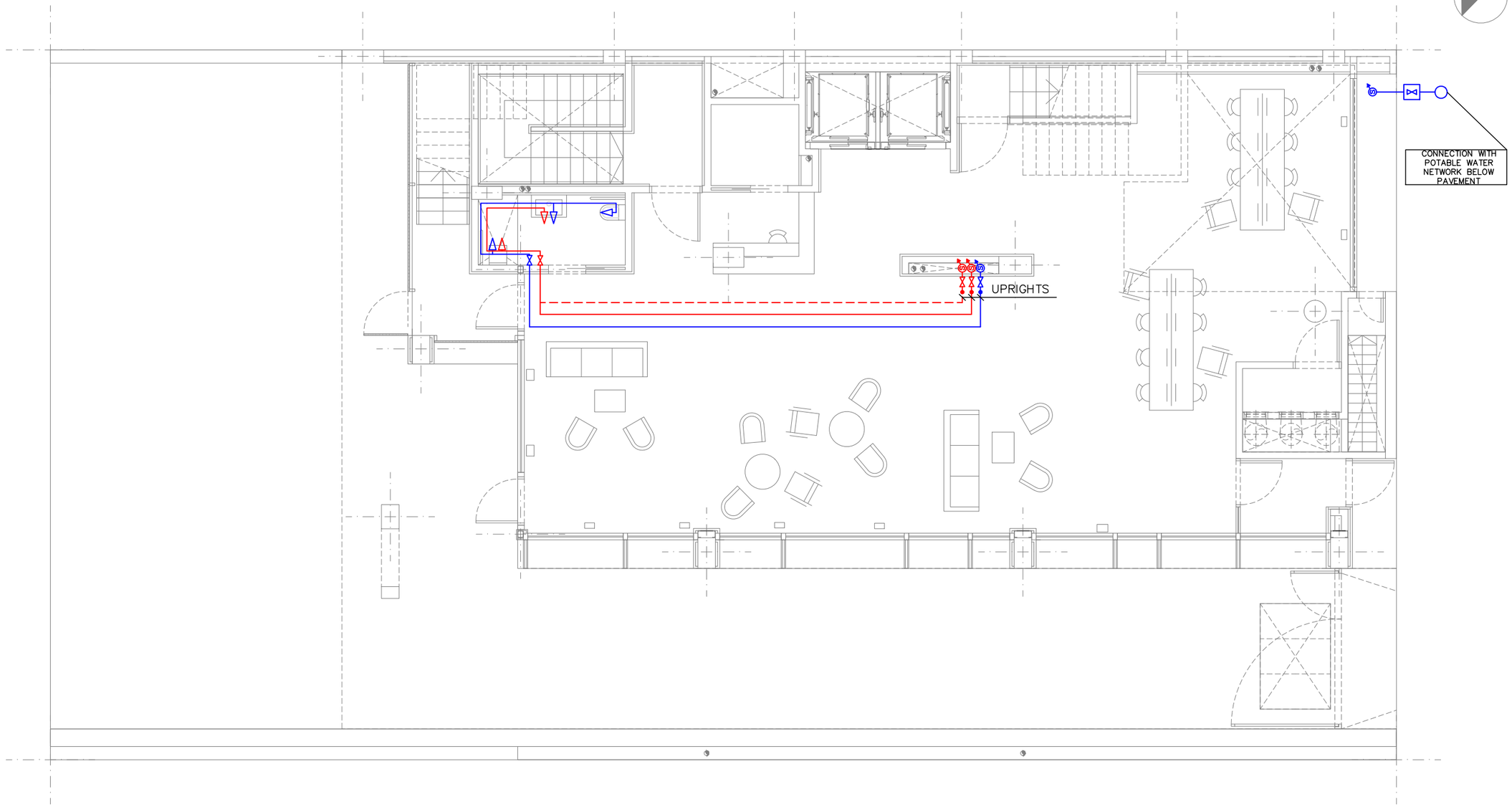
PLAN:

PLUMBING INSTALLATIONS
UNDERGROUND FLOOR

AUTHOR:

ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IFA-01.1A.dwg	IFA01.1A



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OWNER:

UNIVERZA V MARIBORU
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DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
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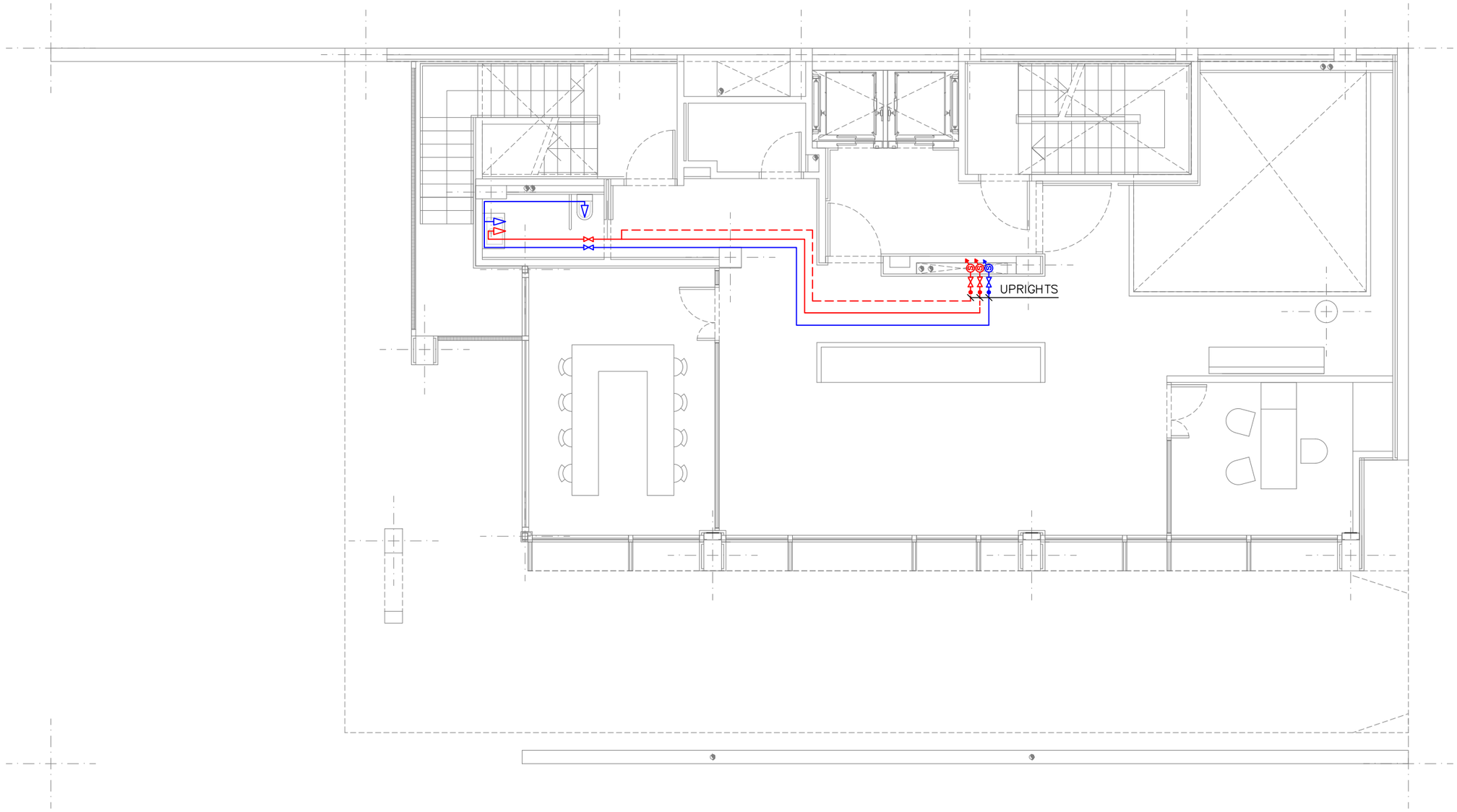
PLUMBING INSTALLATIONS
GROUND FLOOR

AUTHOR:

ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IFA-01.2A.dwg	IFA-01.2A



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OWNER:
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FAKULTETA ZA ELEKTROTEHNIKO, RAČUNALNIŠTVO IN INFORMATIKO

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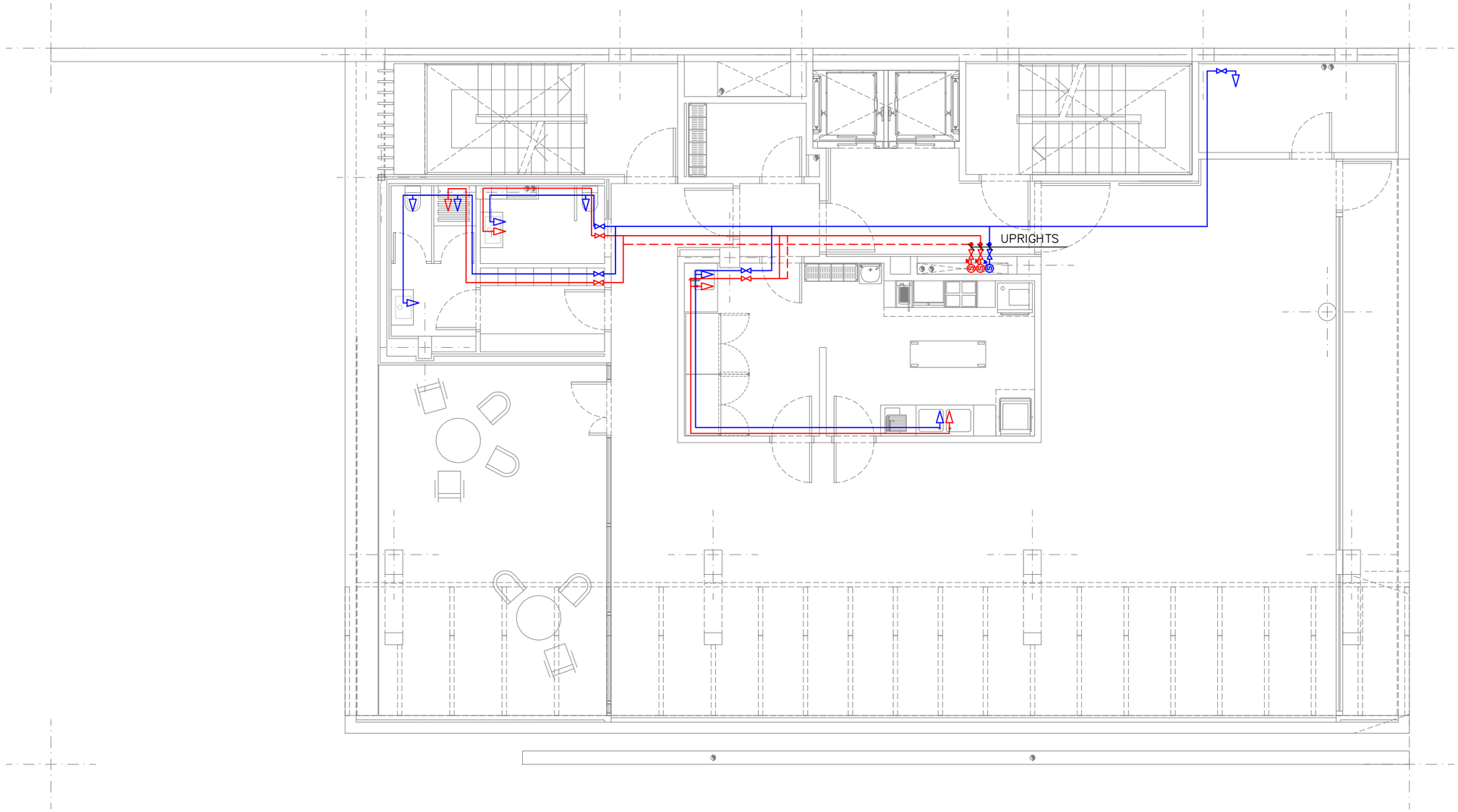
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
PLUMBING INSTALLATIONS
FLOOR 1

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IFA-01.3A.dwg	IFA-01.3A



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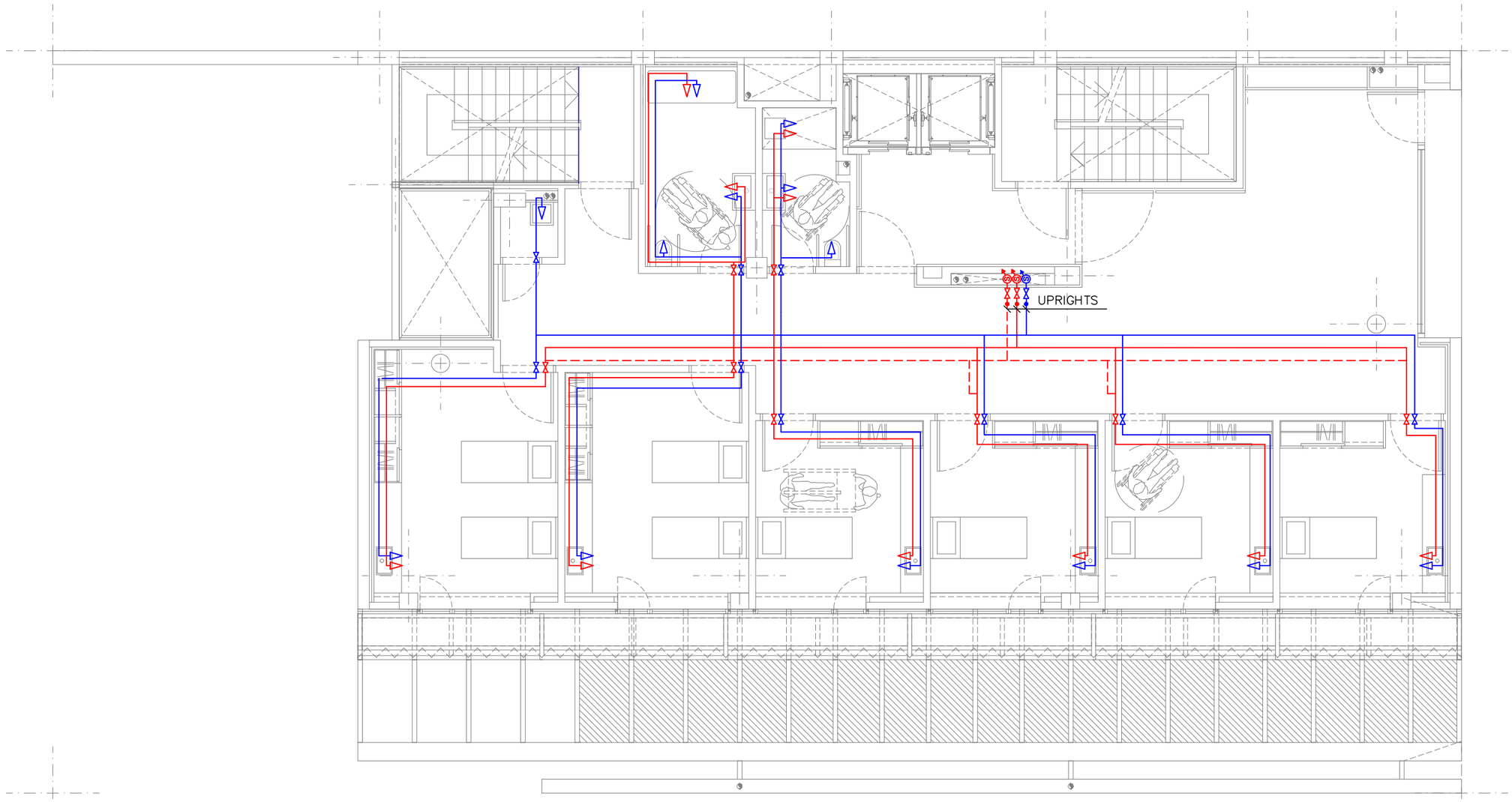
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS AND RELATED DISABILITIES

PLAN:
PLUMBING INSTALLATIONS
FLOOR 2

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IFA-01.4A.dwg	IFA-01.4A



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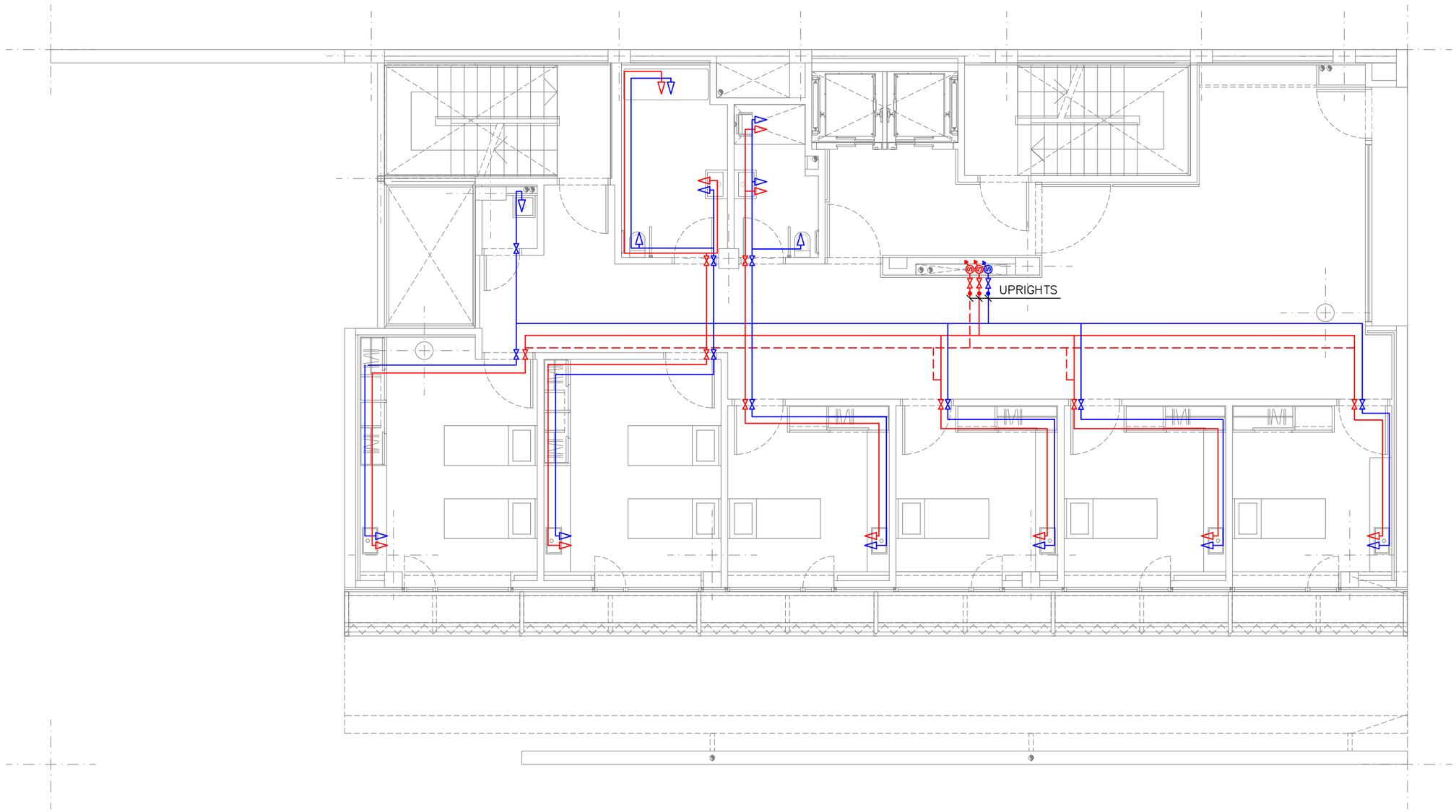
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RAČUNALNIŠTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
PLUMBING INSTALLATIONS
FLOOR 3

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IFA-01.5A.dwg	IFA-01.5A



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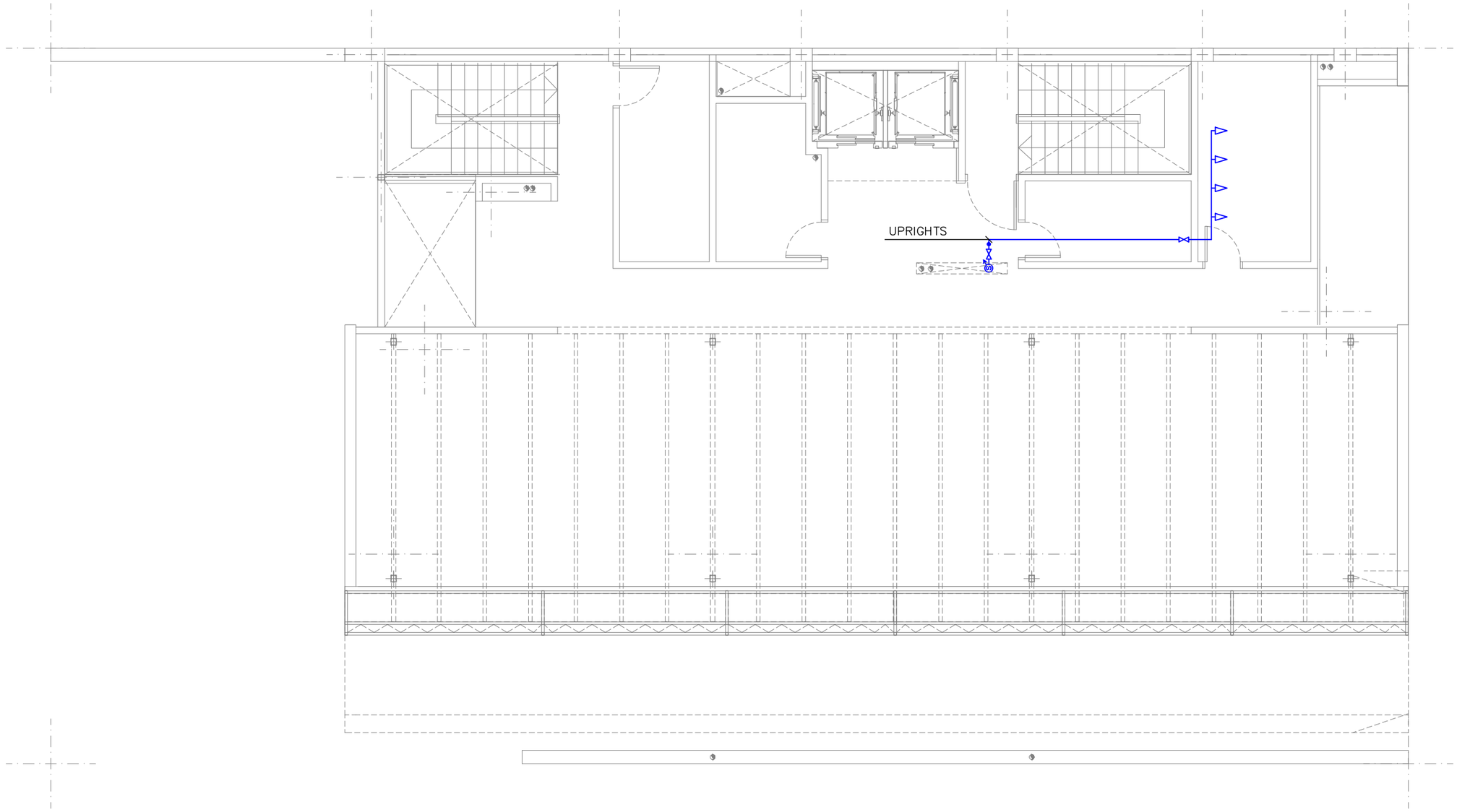
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
PLUMBING INSTALLATIONS
FLOORS 4 AND 5

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IFA-01.6A.dwg	IFA-01.6A



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- SUPPLY CONNECTION CATCH BASIN

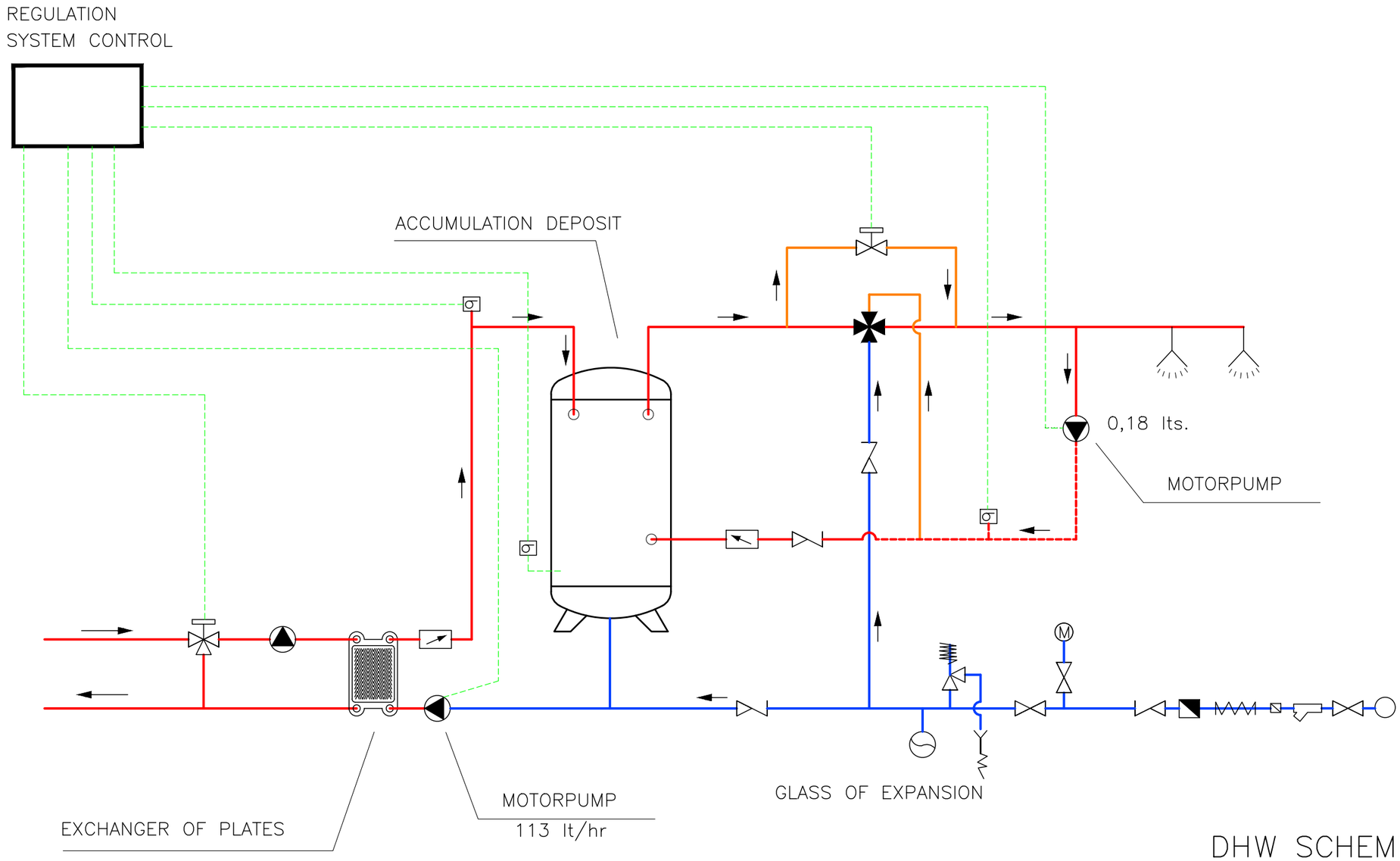
OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS AND RELATED DISABILITIES

PLAN:
PLUMBING INSTALLATIONS
COVERED FLOOR

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IFA-01.7A.dwg	IFA-01.7A



DHW SCHEME

OWNER:
UNIVERZA V MARIBORU
FAKULTETA ZA ELEKTROTEHNIKO, RACUNALNISTVO IN INFORMATIKO

PROJECT:
DESIGN AND CONSTRUCTION OF A HOUSE RESIDENCE
RESIDENCE FOR PEOPLE WITH CEREBRAL PARALYSIS
AND RELATED DISABILITIES

PLAN:
DOMESTIC HOT WATER INSTALLATIONS
PRINCIPLE SCHEME

AUTHOR:
ANA GONZÁLEZ PUEYO

SCALE:	DATE:	FILE	No. PLAN:
A1: 1/100 A3: 1/200	FEBRUARY 2018	A08002-E-IFA-01.8A.dwg	IFA-01.8A

7. ANNEXES

CALCULATION of thermal loads (calculation method: CLTD)

DATA FROM PREVIOUS CALCULATION		VERTICAL ENCLOSURES				AIR CONDITIONING			HEATING	SUMMER	WINTER
										Q sensiblie	Q-sensitive
Project	Multiporpose room	Associated wall	Orientation	Typology	Color/pollution	(M2)	U (W / m2 ° C)	CTD corr	(Ti-Te)	KW	KW
			SE								
Month	JUNE	Wall 2	NE	brick and gypsum	Normal	9.99	0,612	10.97	18	0,067	0,11
Occupation	6	Wall 3	NO	None	Normal	0.00	0.000	9.31	18	0.000	0.000
Surface (m2)	24	Wall 4	NW	None	Normal	0.00	0.000	15.12	18	0.000	0.000
	15										
T. Int. Summer (ºc)	25	Wall 6	SW	None	Normal	0.00	0.000	31,1	18	0.000	0.000
T. Int winter (° C)	20	Wall 7	W	None	Normal	0.00	0.000	29.60	18	0.000	0.000
Humidity (%) realitva	50	Wall 8	NW	None	Normal	0.00	0.000	18.60	18	0.000	0.000
										0,067	0,11

Predefined soil	PRED. User	Selected soil	Ext summer T.	T. Ext winter	AIR CONDITIONING			HEATING	SUMMER	WINTER
Forged	None layer	Predefined	24	20	(M2)	U (W/m2 ° C)	(Ti-Text)	(Ti-Text)	Q sensitive KW	Q sensitive KW
					0	0.85	0	0	0.000	0.000

Predefined ceiling	PRED. User	Chosen roof	Color/pollution	plenum Vent.	AIR CONDITIONING			HEATING	SUMMER	WINTER
Forged	None layer	Predefines	Normal	NO	(M2)	U (W/m2 ° C)	CLTD corr	(Ti-Text)	Q-sensitive (KW	Q-sensitive (KW)
					0	0.85	34.70	18	0.000	0.000

Windows Q = Q.transmision + Q.radiacion				AIR CONDITIONING + HEATING				SUMMER tr+rad	Winter tr
Wall associated	Glass type	Frame type	Protection glass	Area (m2)	U (W / m2 ° C)	QTrans (Kw)	Q rad (Kw)	Q sensitive KW	Q sensitive Kw
Wall 1	Doble glass (absorbent exterior)	metallic frame	interior light curtain	10.00	2.70	0,193	0,403	0,595	0,193
Wall 2	None glass	metallic frame	none curtain none blind	0.00	0.00	0.000	0.000	0.000	0.000
Wall 3	None glass	metallic frame	none curtain none blind	0.00	0.00	0.000	0.000	0.000	0.000
Wall 4	None glass	metallic frame	interior light curtain	0.00	0.00	0.000	0.000	0.000	0.000
5 wall	None glass	metallic frame	none curtain none blind	0.00	0.00	0.000	0.000	0.000	0.000
Wall 6	None glass	metallic frame	none curtain none blind	0.00	0.00	0.000	0.000	0.000	0.000
Wall 7	None glass	metallic frame	none curtain none blind	0.00	0.00	0.000	0.000	0.000	0.000
Wall 8	None glass	metallic frame	none curtain none blind	0.00	0.00	0.000	0.000	0.000	0.000
Ceiling	None glass	metallic frame	none curtain none blind	0.00	0.00	0.000	0.000	0.000	0.000
								0,595	**0,193**

VENTILATION INSIDE							SUMMER	WINTER
Local activity	(l/s) person	(l/s) / m2	Comment	Flow	Flow rate (m3/h)	(m3/h) final	Q Sensiible (KW	Q-sensitive (KW)
Medium indoor air quality (IAQ2)	12.5	0.83	Increase the flow rate double if smoking is allowed	Occupation	270	270	0.554	1,661
							Q latent (KW)	Q latent (KW)
							2,138	0,971

SUMMER SUMMARY	INT LOCAL	VENTILATION	TOTAL (KW)
Q-SENSITIVE (KW)	1,262	0.554	1,816
Q LATENT (KW)	0,24	2,138	2,378
TOTAL (KW)	1,502	2,692	**4,194**
ABSTRACT WINTER	**INT LOCAL**	**VENTILATION**	**TOTAL (KW)**
Q-SENSITIVE (KW)	0,303	1,661	1,963
Q LATENT (KW)	0	0,971	0,971
TOTAL	0,303	2,632	2,934
SUPPLEMENT	plus 10 hours stop		**3,595**

Activity		Activity	Occupancy	Q sen / per (W)	Q.Lat / per (W)	View. Sens (KW)	View. LAT (kw)
Sitting		Theater, cinemas	6	60	40	0.36	0.24
Light type		**Definition**	**P.definida (KW)**	**Surface (m2)**		**View. Sens. (KW)**	
Middle illuminate		10	0	24		**0.24**	
Appliances		**Number devices**	**Q sensitive (W)**	**Q latent (W)**		**Summer Sen (KW**	**View. LAT (KW)**
None appliances		0	0	0		**0.00**	**0.00**
None appliances		0	0	0		**0.00**	**0.00**

Summer rate 174,7502873

Winter ratio 149,7817271

THERMAL Load SUMMARY							
	SUMMER			WINTER			
Place	Total Load (kW)	Load Sensible (kW)	Load Latent (kW)	Load Total (kW)	Load Sensible (kW)	Load Latente (kW)	Ventilation (m3/H)
Multiporpose room	4,19	1,82	2,38	3,59	1,96	0,97	270,00
TOTAL	4,19	1,82	2,38	3,59	1,96	0,97	270,00

CALCULATION OF THERMAL LOADS (Calculation method: Calculation of Charges by Differential Temperature and Cooling Load Factors)

DEPENDENCE	COLD LOAD(kW)	TOTAL SENSIBLE COLD LOAD (kW)	TOTAL LATENT COLD LOAD (kW)	SUMMER RATIO	IMPULSION FLOW (m3/h)	OUTDOOR AIR CONTRIBUTION (m3/h)	HOT LOAD (kW)	TOTAL SENSIBLE HOT LOAD (kW)	TOTAL LATENT HOT LOAD (kW)	WINTER RATIO	IMPULSION FLOW (m3/h)	OUTDOOR AIR CONTRIBUTION (m3/h)
FLOOR -1												
Fitness center	7,41	2,64	4,76	128,00	572,50	173,00	2,40	1,42	0,76	41,00	51,43	173,00
Changing room 1	0,00	0,00	0,00	0,00	270,00	450,00	5,63	3,14	1,98	340,00	15,00	450,00
Changing room 2	0,00	0,00	0,00	0,00	0,00	450,00	5,63	3,13	1,98	381,00	15,00	450,00
TOTAL	**7,41**	**2,64**	**4,76**		**842,50**	**1073,00**	**13,66**	**7,69**	**4,72**		**81,43**	**1073,00**
FLOOR 0												
Entrance	7,01	3,30	3,70	150	617,50	405,00	5,57	3,28	1,78	152	109,29	405,00
Multipurpose room	4,19	2,38	1,86	175	300,00	270,00	3,59	1,96	0,97	150	64,29	270,00
Vestibule	12,05	5,47	6,57	147	1022,50	675,00	9,15	5,34	2,97	111	156,43	675,00
TOTAL	**23,25**	**11,15**	**12,13**		**1940,00**	**1350,00**	**18,31**	**10,58**	**5,72**		**330,00**	**1350,00**
FLOOR 1												
Office	1,62	1,21	0,41	109	254,75	45,00	0,82	0,55	0,19	55	51,43	45,00
File	1,44	1,04	0,39	144	237,50	45,00	0,70	0,44	0,19	70	27,86	45,00
Meeting room	5,54	2,37	3,17	205	407,50	360,00	4,80	2,78	1,28	178	68,57	360,00
Room	4,14	2,49	1,64	129	530,00	180,00	2,58	1,56	0,79	80	70,93	180,00
					1175,00							
TOTAL	**12,74**	**7,11**	**5,61**		**1429,75**	**630,00**	**8,90**	**5,33**	**2,45**		**218,79**	**630,00**
FLOOR 2												
Dinning room	16,11	6,06	9,51	122	1080,00	1080,00	14,38	8,32	4,75	109	201,43	1080,00
Bathroom 1	0,00	0,00	0,00	0,00	0,00	45,00	0,68	0,42	0,19	52	23,57	45,00
TOTAL	**16,11**	**6,06**	**9,51**		**1080,00**	**1125,00**	**15,06**	**8,74**	**4,94**		**225,00**	**1125,00**

FANCOIL daikin			
Electrical power (W)	cassettes	floor / ceiling with enclosure	Flow
107,00	FWC09BT	FWL10DT	642
321,00	FWC09BT x 3	FWL10DT x 4	1926
63	FWF02CT	FWL25DT	241
90	FWC06BT x 2		
		FWL08DT x 2	1140
214	FWC09BT x 2	FWL04DT x 4	1444

FLOOR 3															
Individual bedroom 1	1,20	0,80	0,40	82	175,00	45,00	0,82	0,54	0,20	55	49,29	45,00	74,00	FWF02BT	FWL02DT	211
Individual bedroom 2	1,20	0,80	0,40	82	175,00	45,00	0,82	0,54	0,20	55	49,29	45,00	74,00	FWF02BT	FWL02DT	211
Individual bedroom 3	1,20	0,80	0,40	82	175,00	45,00	0,82	0,54	0,20	55	49,29	45,00	74,00	FWF02BT	FWL02DT	211
Individual bedroom 4	1,20	0,80	0,40	82	175,00	45,00	0,82	0,54	0,20	55	49,29	45,00	74,00	FWF02BT	FWL02DT	211
Double bedroom 1	1,73	0,91	0,82	86	180,00	90,00	1,43	0,90	0,39	72	62,14	90,00	74,00	FWF02BT	FWL02DT	211
Double bedroom 2	1,73	0,91	0,82	86	180,00	90,00	1,43	0,90	0,39	72	62,14	90,00	74,00	FWF02BT	FWL02DT	211
Dinning room	5,20	1,9	3,29	148	290,00	360	4,72	2,71	1,58	134	53,57	360	54,00	FWC07BT	FWL08DT	570
TOTAL	**13,46**	**6,92**	**6,53**		**1350,00**	**720,00**	**10,86**	**6,67**	**3,16**		**375,00**	**720,00**				
FLOOR 4															
Individual bedroom 1	1,20	0,80	0,40	82	175,00	45,00	0,82	0,54	0,20	55	49,29	45,00	74,00	FWF02BT	FWL02DT	211
Individual bedroom 2	1,20	0,80	0,40	82	175,00	45,00	0,82	0,54	0,20	55	49,29	45,00	74,00	FWF02BT	FWL02DT	211
Individual bedroom 3	1,20	0,80	0,40	82	175,00	45,00	0,82	0,54	0,20	55	49,29	45,00	74,00	FWF02BT	FWL02DT	211
Individual bedroom 4	1,20	0,80	0,40	82	175,00	45,00	0,82	0,54	0,20	55	49,29	45,00	74,00	FWF02BT	FWL02DT	211
Double bedroom 1	1,73	0,91	0,82	86	180,00	90,00	1,43	0,90	0,39	72	62,14	90,00	74,00	FWF02BT	FWL02DT	211
Double bedroom 2	1,73	0,91	0,82	86	180,00	90,00	1,43	0,90	0,39	72	62,14	90,00	74,00	FWF02BT	FWL02DT	211
Dinning room	5,20	1,9	3,29	148	290,00	360	4,72	2,71	1,58	134	53,57	360	54,00	FWC07BT	FWL08DT	570
TOTAL	**13,46**	**6,92**	**6,53**		**1350,00**	**720,00**	**10,86**	**6,67**	**3,16**		**375,00**	**720,00**				
FLOOR 5															
Individual bedroom 1	1,65	1,25	0,39	113,00	290,00	45,00	1,04	0,76	0,17	70,00	94,00	45,00	74,00	FWF02BT	FWL02DT	211
Individual bedroom 2	1,65	1,25	0,39	113,00	290,00	45,00	1,04	0,76	0,17	70,00	94,00	45,00	74,00	FWF02BT	FWL02DT	211
Individual bedroom 3	1,65	1,25	0,39	113,00	290,00	45,00	1,04	0,76	0,17	70,00	94,00	45,00	74,00	FWF02BT	FWL02DT	211
Individual bedroom 4	1,65	1,25	0,39	113,00	290,00	45,00	1,04	0,76	0,17	70,00	94,00	45,00	74,00	FWF02BT	FWL02DT	211
Double bedroom 1	2,32	1,50	0,82	115,00	342,50	90,00	1,79	1,23	0,39	88,00	124,00	90,00	74,00	FWF02BT	FWL02DT	211
Double bedroom 2	2,32	1,50	0,82	115,00	342,50	90,00	1,79	1,23	0,39	88,00	124,00	90,00	74,00	FWF02BT	FWL02DT	211
Dinning room	6,23	2,95	3,29	178,00	550,00	360,00	5,37	3,30	1,58	153,00	168,00	360,00	77,00	FWC08BT F	FWL10DT	642
TOTAL	**17,47**	**10,95**	**6,49**		**2395,00**	**720,00**	**13,11**	**8,80**	**3,04**		**792,00**	**720,00**				
TOTAL	**103,90**	**51,75**	**51,56**		**10387,25**	**6338,00**	**90,76**	**54,48**	**27,19**		**2397,21**	**6338,00**	2312,00			

CALCULATION OF THE SECTION, FALL OF TENSION AND SHORT CIRCUIT OF THE ELECTRICAL CIRCUITS

LINE			Installed power	Coef.	N° Circuits	Power of calculation	Tension	Intensity of calculation	Material	Type	Reference method of the	Correction factor	Intensity of calculation for the section	Section	Admissible intensity of the cable	FOT Partial	FOT Partial	FOT Acumulated
			[kW]	Simultaneity		[kW]	[V]	[A]	Conductor	Isolation	Installation	Total	[A]	[mm2]	[A]	[V]	[%]	[%]
					151,28	277												
CPM	-	**LVGC**	173,65	0,87	1,00	151,28	400	242,61	Cu-Uni	XLPE	Buried	0,90	269,6	**240**	No trobat	0,36	0,09	**0,09**
LVGC			**LOW VOLTAGE GENERAL CHART**															
LVGC		**CONDENSER BATTERIES**	180KVAr															
			160,00	1,00	1,00	160,00	400	256,60	Cu-Uni	XLPE	B	0,85	302	**150**	338	0,00	0,00	**0,09**
LVGC		**CUF - N**	19,98	0,80	1,00	15,98	400	25,63	Cu-Tri	XLPE	B	0,85	30	**35**	131	0,13	0,03	**0,12**
LVGC		**CGF - N**	19,13	0,85	1,00	16,26	400	26,08	Cu-Tri	XLPE	B	0,85	31	**10**	60	3,25	0,81	**0,90**
LVGC		**CF1 - N**	7,63	0,85	1,00	6,48	400	10,40	Cu-Tri	XLPE	B	0,85	12	**10**	60	1,04	0,26	**0,35**
LVGC		**CF2 - N**	5,78	0,85	1,00	4,91	400	7,87	Cu-Tri	XLPE	B	0,85	9	**10**	60	0,90	0,22	**0,31**
LVGC		**CKI - N**	20,15	0,75	1,00	15,11	400	24,24	Cu-Tri	XLPE	B	0,85	29	**16**	80	1,73	0,43	**0,52**
LVGC		**CF3 - N**	11,94	0,85	1,00	10,15	400	16,28	Cu-Tri	XLPE	B	0,85	19	**10**	60	2,32	0,58	**0,67**
LVGC		**CF4 - N**	13,31	0,85	1,00	11,31	400	18,15	Cu-Tri	XLPE	B	0,85	21	**10**	60	2,84	0,71	**0,80**
LVGC		**CF5 - N**	11,94	0,85	1,00	10,15	400	16,28	Cu-Tri	XLPE	B	0,85	19	**10**	60	2,78	0,70	**0,79**
LVGC		**CF6 - N**	19,19	0,85	1,00	16,31	400	26,16	Cu-Tri	XLPE	B	0,85	31	**10**	60	4,19	1,05	**1,14**
ELECTROGEN GROUP			44,61	1,00	1,00	44,61	400	71,54	Cu-Tri	XLPE	B	0,85	84	**25**	106	4,59	1,15	**1,24**
LVGC		**CUF - P**	1,27	1,00	1,00	1,27	400	2,04	Cu-Tri	XLPE	B	0,85	2	**4**	34	0,09	0,02	**0,11**
LVGC		**CUPS**	10,00	1,00	1,00	10,00	400	16,04	Cu-Tri	XLPE	B	0,85	19	**6**	44	0,48	0,12	**0,21**
LVGC		**FPC - P**	13,20	1,00	1,00	13,20	400	21,17	Cu-Tri	XLPE	B	0,85	25	**6**	44	1,89	0,47	**0,56**
LVGC		**CF3 - P**	0,33	1,00	1,00	0,33	400	0,53	Cu-Tri	XLPE	B	0,85	1	**4**	34	0,12	0,03	**0,12**
LVGC		**CVENT**	4,80	1,25	1,00	6,01	400	9,63	Cu-Tri	XLPE	B	0,85	11	**6**	44	2,57	0,64	**0,73**
LVGC		**CELV - P**	7,50	1,50	1,00	11,25	400	18,04	Cu-Tri	XLPE	B	0,85	21	**10**	60	2,38	0,59	**0,68**
LVGC		**CELV - P**	7,50	1,50	1,00	11,25	400	18,04	Cu-Tri	XLPE	B	0,85	21	**10**	60	2,38	0,59	**0,68**
CUF - P			**UNDERGROUND FLOOR CHART PREFERENT SUPPLY**															
CUF - P	**LE1**	**ILLUM. RIGHT STAIRS**	0,00	1,80	1,00	0,01	230	0,03	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,02	0,01	**0,12**
CUF - P	**LE2**	**ILLUM. LEFT STAIRS**	0,00	1,80	1,00	0,01	230	0,03	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,02	0,01	**0,12**
CUF - P	**EE1**	**ILLUM. EMERGENCY STAIRS**	0,02	1,80	1,00	0,03	230	0,13	Cu-Tri	XLPE	B	0,85	0	**1,5**	21	0,18	0,08	**0,19**
CUF - P	**R1**	**RACK**	0,75	1,25	1,00	0,94	230	4,53	Cu-Tri	XLPE	B	0,85	5	**4**	38	1,12	0,49	**0,60**
CUF - P	**CC1**	**FIRE PROTECTION CENTRAL**	0,50	1,00	1,00	0,50	230	2,42	Cu-Tri	XLPE	B	0,85	3	**2,5**	29	0,95	0,41	**0,53**
CUF - N			**UNDERGROUND FLOOR CHART NORMAL SUPPLY**															
CUF - N	**L3**	**ILLUM. TOILET+WAREHOUSE**	0,04	1,80	1,00	0,07	230	0,34	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,14	0,06	**0,18**
CUF - N	**L4**	**ILLUM. DISTRC.+ INST. HOSE REEL**	0,04	1,80	1,00	0,07	230	0,34	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,08	0,04	**0,16**
CUF - N	**E1**	**ILLUM.EMERG.**	0,02	1,80	1,00	0,03	230	0,13	Cu-Tri	XLPE	B	0,85	0	**1,5**	21	0,11	0,05	**0,17**
CUF - N	**L5**	**ILLUM. CHANG. BOYS**	0,03	1,80	1,00	0,05	230	0,24	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,06	0,03	**0,15**
CUF - N	**L6**	**ILLUM. CHANG. GIRLS**	0,03	1,80	1,00	0,05	230	0,24	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,04	0,02	**0,14**
CUF - N	**L7**	**ILLUM.CIRCULATION**	0,03	1,80	1,00	0,05	230	0,23	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,08	0,03	**0,16**
CUF - N	**L8**	**ILLUM.CIRCULATION**	0,03	1,80	1,00	0,05	230	0,23	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,08	0,03	**0,16**
CUF - N	**E2**	**ILLUM.EMERG.**	0,02	1,80	1,00	0,03	230	0,13	Cu-Tri	XLPE	B	0,85	0	**1,5**	21	0,07	0,03	**0,15**
CUF - N	**L9**	**ILLUM. GYM**	0,04	1,80	1,00	0,07	230	0,32	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,10	0,05	**0,17**
CUF - N	**L10**	**ILLUM. GYM**	0,04	1,80	1,00	0,07	230	0,32	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,10	0,05	**0,17**
CUF - N	**L11**	**ILLUM. OFFICE+WHARE.**	0,05	1,80	1,00	0,09	230	0,44	Cu-Tri	XLPE	B	0,85	1	**2,5**	29	0,07	0,03	**0,15**
CUF - N	**L12**	**ILLUM. GARBAGE**	0,01	1,80	1,00	0,02	230	0,12	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,02	0,01	**0,13**
CUF - N	**E3**	**ILLUM.EMERG.**	0,02	1,80	1,00	0,03	230	0,13	Cu-Tri	XLPE	B	0,85	0	**1,5**	21	0,04	0,02	**0,14**
CUF - N	**CL1**	**FANCOIL**	0,96	1,25	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	**2,5**	29	0,95	0,41	**0,54**
CUF - N	**CL2**	**FANCOIL**	0,15	1,25	1,00	0,19	230	0,91	Cu-Tri	XLPE	B	0,85	1	**2,5**	29	0,22	0,10	**0,22**
CUF - N	**F1**	**FORCE CHANG. BOYS**	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	**2,5**	29	1,43	0,62	**0,74**
CUF - N	**F2**	**FORCE CHANG. GIRLS**	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	**2,5**	29	0,95	0,41	**0,54**
CUF - N	**F3**	**FORCE GYM**	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	**2,5**	29	1,91	0,83	**0,95**
CUF - N	**F4**	**FORCE INST.HOSE REEL**	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	**2,5**	29	1,43	0,62	**0,74**
CUF - N	**F5**	**FORCE DISTRICLIMA**	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	**2,5**	29	1,91	0,83	**0,95**
CUF - N	**F6**	**FORCE ADAPTED TOILET**	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	**2,5**	29	2,39	1,04	**1,16**
CUF - N	**F8**	**FORCE WAREHOUSE**	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	**2,5**	29	2,39	1,04	**1,16**
CUF - N	**BA1**	**BILGE PUMP 1**	1,50	1,25	1,00	1,88	230	9,06	Cu-Tri	XLPE	B	0,85	11	**2,5**	29	3,28	1,43	**1,55**
CUF - N	**BA2**	**BILGE PUMP 2**	1,50	1,25	1,00	1,88	230	9,06	Cu-Tri	XLPE	B	0,85	11	**2,5**	29	2,98	1,30	**1,42**
CUF - N	**BA3**	**BILGE PUMP 3**	1,50	1,25	1,00	1,88	230	9,06	Cu-Tri	XLPE	B	0,85	11	**2,5**	29	2,09	0,91	**1,03**
CUF - N	**BA4**	**BILGE PUMP 4**	1,50	1,25	1,00	1,88	230	9,06	Cu-Tri	XLPE	B	0,85	11	**2,5**	29	1,49	0,65	**0,77**
CUF - N	**CDI**	**DISTRICLIMA DP**	2,00	1,00	1,00	2,00	400	3,21	Cu-Tri	XLPE	B	0,85	4	**6**	44	0,29	0,07	**0,19**
CDI	**B1**	**COLD WATER PUMP**	1,50	1,25	1,00	1,88	230	9,06	Cu-Tri	XLPE	B	0,85	11	**2,5**	29	0,75	0,32	**0,45**
CDI	**B4**	**SOLAR AC PUMP**	0,50	1,25	1,00	0,63	230	3,02	Cu-Tri	XLPE	B	0,85	4	**2,5**	29	0,25	0,11	**0,23**
FCP - P			**FIRE PROTECTION CHART PREFERENT SUPPLY**															
FPC - P	**BP**	**PRINCIPAL BOMB**	11,00	1,25	1,00	13,75	400	22,05	Cu-Tri	XLPE	B	0,85	26	**4**	34	0,79	0,20	**0,76**
FCP - P	**BJ**	**BOMB JOCKEY**	2,20	1,25	1,00	2,75	230	13,29	Cu-Tri	XLPE	B	0,85	16	**2,5**	29	0,87	0,38	**0,94**
CUPS - P			**UNINTERRUPTIBLE POWER SUPPLY CHART PREFERENT SUPPLY**															
CUPS	**S1**	**FORCE UPS RECEPTION. GF**	2,00	0,80	1,00	1,60	230	7,73	Cu-Tri	XLPE	B	0,85	9	**4**	38	1,99	0,86	**1,07**
CUPS	**S2**	**FORCE UPS MEETING ROOM F1**	2,00	0,80	1,00	1,60	230	7,73	Cu-Tri	XLPE	B	0,85	9	**4**	38	3,58	1,56	**1,76**
CUPS	**S3**	**FORCE UPS ROOM F1**	2,00	0,80	1,00	1,60	230	7,73	Cu-Tri	XLPE	B	0,85	9	**4**	38	3,98	1,73	**1,94**
CUPS	**S4**	**FORCE UPS ROOM F1**	2,00	0,80	1,00	1,60	230	7,73	Cu-Tri	XLPE	B	0,85	9	**4**	38	4,37	1,90	**2,11**
CUPS	**S5**	**FORCE UPS OFFICE F1**	2,00	0,80	1,00	1,60	230	7,73	Cu-Tri	XLPE	B	0,85	9	**4**	38	4,77	2,07	**2,28**

CALCULATION OF THE SECTION, FALL OF TENSION AND SHORT CIRCUIT OF THE ELECTRICAL CIRCUITS

LINE			Installed power	Coef.	N° Circuits	Power of calculation	Tension	Intensity of calculation	Material	Type	Reference method of the	Correction factor	Intensity of calculation for the section	Section	Admissible intensity of the cable	FOT Partial	FOT Partial	FOT Acumulated
			[kW]	Simultaneity		[kW]	[V]	[A]	Conductor	Isolation	Installation	Total	[A]	[mm2]	[A]	[V]	[%]	[%]
CGF - N			**GROUND FLOOR CHART NORMAL SUPPLY**															
CGF - N	**L1**	**ILLUM. MEETING SPACE**	0,03	1,80	1,00	0,05	230	0,24	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,08	0,03	**0,94**
CGF - N	**L2**	**ILLUM. MEETING SPACE**	0,03	1,80	1,00	0,05	230	0,24	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,08	0,03	**0,94**
CGF - N	**L3**	**ILLUM.MULTIPURPOSE ROOM**	0,01	1,80	1,00	0,02	230	0,09	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,05	0,02	**0,92**
CGF - N	**L4**	**ILLUM.MULTIPURPOSE ROOM**	0,01	1,80	1,00	0,02	230	0,09	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,05	0,02	**0,92**
CGF - N	**E1**	**ILLUM.EMERG.**	0,02	1,80	1,00	0,03	230	0,13	Cu-Tri	XLPE	B	0,85	0	**1,5**	21	0,07	0,03	**0,93**
CGF - N	**L5**	**ILLUM. ADAPTED TOILET**	0,01	1,80	1,00	0,03	230	0,12	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,03	0,01	**0,92**
CGF - N	**L6**	**ILLUM.WAREHOUSE+RECEPTION**	0,01	1,80	1,00	0,02	230	0,09	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,01	0,01	**0,91**
CGF - N	**E2**	**ILLUM.EMERG.**	0,02	1,80	1,00	0,03	230	0,13	Cu-Tri	XLPE	B	0,85	0	**1,5**	21	0,05	0,02	**0,93**
CGF - N	**F1**	**FORCE MULTIPURPOSE ROOM**	2,00	0,80	1,00	1,60	230	7,73	Cu-Tri	XLPE	B	0,85	9	**2,5**	29	2,54	1,11	**2,01**
CGF - N	**F2**	**FORCE MULTIPURPOSE ROOM**	2,00	0,80	1,00	1,60	230	7,73	Cu-Tri	XLPE	B	0,85	9	**2,5**	29	2,54	1,11	**2,01**
CGF - N	**F3**	**FORCE MULTIPURPOSE ROOM**	2,00	0,80	1,00	1,60	230	7,73	Cu-Tri	XLPE	B	0,85	9	**2,5**	29	2,54	1,11	**2,01**
CGF - N	**F4**	**FORCE MULTIPURPOSE ROOM**	2,00	0,80	1,00	1,60	230	7,73	Cu-Tri	XLPE	B	0,85	9	**2,5**	29	2,54	1,11	**2,01**
CGF - N	**F5**	**FORCE MULTIPURPOSE ROOM**	2,00	0,80	1,00	1,60	230	7,73	Cu-Tri	XLPE	B	0,85	9	**2,5**	29	3,82	1,66	**2,56**
CGF - N	**F6**	**FORCE MULTIPURPOSE ROOM**	2,00	0,80	1,00	1,60	230	7,73	Cu-Tri	XLPE	B	0,85	9	**2,5**	29	3,82	1,66	**2,56**
CGF - N	**F7**	**FORCE MULTIPURPOSE ROOM**	2,00	0,80	1,00	1,60	230	7,73	Cu-Tri	XLPE	B	0,85	9	**2,5**	29	3,82	1,66	**2,56**
CGF - N	**F8**	**FORCE MULTIPURPOSE ROOM**	2,00	0,80	1,00	1,60	230	7,73	Cu-Tri	XLPE	B	0,85	9	**2,5**	29	3,82	1,66	**2,56**
CGF - N	**F9**	**FORCE MEETING SPACE**	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	**2,5**	29	2,39	1,04	**1,94**
CGF - N	**F10**	**FORCE ADAPTED TOILET+WAREHOUSE**	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	**2,5**	29	1,43	0,62	**1,53**
CF1 - N			**FLOOR 1 CHART NORMAL SUPPLY**															
CF1 - N	**L1**	**ILLUM. MEETING ROOM**	0,07	1,80	1,00	0,13	230	0,64	Cu-Tri	XLPE	B	0,85	1	**2,5**	29	0,16	0,07	**0,42**
CF1 - N	**L2**	**ILLUM.OFFICE AND ROOM**	0,04	1,80	1,00	0,07	230	0,32	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,16	0,07	**0,42**
CF1 - N	**L3**	**ILLUM.OFFICE AND ROOM**	0,04	1,80	1,00	0,07	230	0,32	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,16	0,07	**0,42**
CF1 - N	**E1**	**ILLUM.EMERG.**	0,02	1,80	1,00	0,03	230	0,13	Cu-Tri	XLPE	B	0,85	0	**1,5**	21	0,11	0,05	**0,40**
CF1 - N	**L4**	**ILLUM.CIRCULATION**	0,08	1,80	1,00	0,14	230	0,69	Cu-Tri	XLPE	B	0,85	1	**2,5**	29	0,28	0,12	**0,47**
CF1 - N	**L5**	**ILLUM.TOILET + FILE**	0,02	1,80	1,00	0,03	230	0,16	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,04	0,02	**0,37**
CF1 - N	**L6**	**ILLUM.INTERIOR PASS**	0,09	1,80	1,00	0,15	230	0,74	Cu-Tri	XLPE	B	0,85	1	**2,5**	29	0,49	0,21	**0,56**
CF1 - N	**E2**	**ILLUM.EMERG.**	0,02	1,80	1,00	0,03	230	0,13	Cu-Tri	XLPE	B	0,85	0	**1,5**	21	0,09	0,04	**0,39**
CF1 - N	**CL1**	**FANCOILS**	0,77	1,25	1,00	0,96	230	4,65	Cu-Tri	XLPE	B	0,85	5	**2,5**	29	0,38	0,17	**0,52**
CF1 - N	**F1**	**FORCE TOILET + WAREHOUSE**	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	**2,5**	29	1,43	0,62	**0,97**
CF1 - N	**F2**	**FORCE MEETING ROOM**	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	**2,5**	29	1,43	0,62	**0,97**
CF1 - N	**F3**	**FORCE ROOM**	2,00	0,80	1,00	1,60	230	7,73	Cu-Tri	XLPE	B	0,85	9	**2,5**	29	1,91	0,83	**1,18**
CF1 - N	**F6**	**FORCE OFFICE**	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	**2,5**	29	3,34	1,45	**1,80**
CF2 - N			**FLOOR 2 CHART NORMAL SUPPLY**															
CF2 - N	**L1**	**ILLUM. DINING ROOM**	0,05	1,80	1,00	0,09	230	0,41	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,20	0,09	**0,40**
CF2 - N	**L2**	**ILLUM. DINING ROOM**	0,05	1,80	1,00	0,09	230	0,41	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,20	0,09	**0,40**
CF2 - N	**L3**	**ILLUM. DINING ROOM**	0,05	1,80	1,00	0,09	230	0,41	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,20	0,09	**0,40**
CF2 - N	**E1**	**ILLUM.EMERG.**	0,02	1,80	1,00	0,03	230	0,13	Cu-Tri	XLPE	B	0,85	0	**1,5**	21	0,11	0,05	**0,36**
CF2 - N	**L4**	**ILLUM.CHANG. + TOILET.**	0,05	1,80	1,00	0,09	230	0,41	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,10	0,04	**0,36**
CF2 - N	**L5**	**ILLUM.CIRCUL+WAREHOUSES**	0,06	1,80	1,00	0,11	230	0,54	Cu-Tri	XLPE	B	0,85	1	**2,5**	29	0,18	0,08	**0,39**
CF2 - N	**L6**	**ILLUM. TERRACE**	0,03	1,80	1,00	0,06	230	0,28	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,12	0,05	**0,37**
CF2 - N	**E2**	**ILLUM.EMERG.**	0,02	1,80	1,00	0,03	230	0,13	Cu-Tri	XLPE	B	0,85	0	**1,5**	21	0,09	0,04	**0,35**
CF2 - N	**CL1**	**FANCOIL**	0,96	1,25	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	**2,5**	29	0,95	0,41	**0,73**
CF2 - N	**F1**	**FORCE CHANG. + TOILET**	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	**2,5**	29	1,43	0,62	**0,94**
CF2 - N	**F2**	**FORCE DINING ROOMS**	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	**2,5**	29	2,86	1,24	**1,56**
CF2 - N	**F3**	**FORCE WAREHOUSE**	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	**2,5**	29	2,39	1,04	**1,35**
CKI - N			**KITCHEN CHART NORMAL SUPPLY**															
CKI - N	**L1**	**ILLUM.KITCHEN**	0,06	1,25	1,00	0,08	230	0,39	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,10	0,04	**0,56**
CKI - N	**E1**	**ILLUM.EMERG.**	0,02	1,25	1,00	0,02	230	0,09	Cu-Tri	XLPE	B	0,85	0	**1,5**	21	0,04	0,02	**0,54**
CKI - N	**F1**	**FORCE KITCHEN**	1,50	1,25	1,00	1,88	230	9,06	Cu-Tri	XLPE	B	0,85	11	**2,5**	29	2,24	0,97	**1,49**
CKI - N	**FR**	**FRYER**	2,80	1,25	1,00	3,50	230	16,91	Cu-Tri	XLPE	B	0,85	20	**4**	38	2,61	1,13	**1,66**
CKI - N	**PL**	**GRIDDLE**	1,20	1,25	1,00	1,50	400	2,41	Cu-Tri	XLPE	B	0,85	3	**4**	34	0,32	0,08	**0,60**
CKI - N	**CU**	**KITCHEN**	7,00	1,25	1,00	8,75	400	14,03	Cu-Tri	XLPE	B	0,85	17	**4**	34	1,88	0,47	**0,99**
CKI - N	**FN**	**OVEN**	3,30	1,25	1,00	4,13	400	6,62	Cu-Tri	XLPE	B	0,85	8	**4**	34	0,88	0,22	**0,74**
CKI - N	**NV**	**FRIDGE**	2,00	1,25	1,00	2,50	230	12,08	Cu-Tri	XLPE	B	0,85	14	**4**	38	1,86	0,81	**1,33**
CKI - N	**TD**	**CUTTING MACHINE**	0,77	1,25	1,00	0,96	230	4,65	Cu-Tri	XLPE	B	0,85	5	**2,5**	29	1,15	0,50	**1,02**
CKI - N	**RP**	**DISHWASHER**	1,50	1,25	1,00	1,88	400	3,01	Cu-Tri	XLPE	B	0,85	4	**4**	34	0,40	0,10	**0,62**
CF3 - P			**FLOOR 3 CHART PREFERENT SUPPLY**															
CF3 - P	**L1**	**ILLUM.BEDROOM TYPE 2 F3**	0,04	1,80	1,00	0,07	230	0,35	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,23	0,10	**0,22**
CF3 - P	**L2**	**ILLUM.BEDROOM TYPE 1 F3**	0,06	1,80	1,00	0,10	230	0,49	Cu-Tri	XLPE	B	0,85	1	**2,5**	29	0,24	0,10	**0,23**
CF3 - P	**E1**	**ILLUM.EMERG.**	0,02	1,80	1,00	0,03	230	0,13	Cu-Tri	XLPE	B	0,85	0	**1,5**	21	0,14	0,06	**0,18**
CF3 - P	**L2**	**ILLUM.BEDROOM TYPE 2 F4**	0,04	1,80	1,00	0,07	230	0,35	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,20	0,09	**0,21**
CF3 - P	**L3**	**ILLUM.BEDROOM TYPE 1 F4**	0,06	1,80	1,00	0,10	230	0,49	Cu-Tri	XLPE	B	0,85	1	**2,5**	29	0,28	0,12	**0,24**
CF3 - P	**E2**	**ILLUM.EMERG.**	0,02	1,80	1,00	0,03	230	0,13	Cu-Tri	XLPE	B	0,85	0	**1,5**	21	0,13	0,05	**0,18**
CF3 - P	**L4**	**ILLUM.BEDROOM TYPE 2 F5**	0,04	1,80	1,00	0,07	230	0,35	Cu-Tri	XLPE	B	0,85	0	**2,5**	29	0,23	0,10	**0,22**
CF3 - P	**L5**	**ILLUM.BEDROOM TYPE 1 F5**	0,06	1,80	1,00	0,10	230	0,49	Cu-Tri	XLPE	B	0,85	1	**2,5**	29	0,32	0,14	**0,26**
CF3 - P	**E3**	**ILLUM.EMERG.**	0,02	1,80	1,00	0,03	230	0,13	Cu-Tri	XLPE	B	0,85	0	**1,5**	21	0,14	0,06	**0,18**

CALCULATION OF THE SECTION, FALL OF TENSION AND SHORT CIRCUIT OF THE ELECTRICAL CIRCUITS

LINE			Installed power	Coef.	Nº Circuits	Power of calculation	Tension	Intensity of calculation	Material	Type	Reference method of the	Correction factor	Intensity of calculation for the section	Section	Admissible intensity of the cable	FOT Partial	FOT Partial	FOT Acumulated
			[kW]	Simultaneity		[kW]	[V]	[A]	Conductor	Isolation	Installation	Total	[A]	[mm2]	[A]	[V]	[%]	[%]
CF3 - N			**FLOOR 3 CHART NORMAL SUPPLY**															
CF3 - N	L1	ILLUM. DINING+CIRCUL	0,03	1,80	1,00	0,06	230	0,28	Cu-Tri	XLPE	B	0,85	0	2,5	29	0,14	0,06	**0,73**
CF3 - N	L2	ILLUM.DINING+CIRCUL	0,03	1,80	1,00	0,06	230	0,28	Cu-Tri	XLPE	B	0,85	0	2,5	29	0,14	0,06	**0,73**
CF3 - N	L3	ILLUM.DINING+CIRCUL	0,03	1,80	1,00	0,06	230	0,28	Cu-Tri	XLPE	B	0,85	0	2,5	29	0,14	0,06	**0,73**
CF3 - N	L4	ILLUM TOILET+WARE.	0,04	1,80	1,00	0,06	230	0,31	Cu-Tri	XLPE	B	0,85	0	2,5	29	0,15	0,07	**0,74**
CF3 - N	E1	ILLUM.EMERG.	0,02	1,80	1,00	0,03	230	0,13	Cu-Tri	XLPE	B	0,85	0	1,5	21	0,11	0,05	**0,72**
CF3 - N	CL1	FANCOIL	0,15	1,25	1,00	0,19	230	0,91	Cu-Tri	XLPE	B	0,85	1	2,5	29	0,22	0,10	**0,77**
CF3 - N	CL2	FANCOILS BEDROOMS	0,07	1,25	1,00	0,09	230	0,43	Cu-Tri	XLPE	B	0,85	1	2,5	29	0,14	0,06	**0,73**
CF3 - N	CL3	FANCOILS BEDROOMS	0,07	1,25	1,00	0,09	230	0,43	Cu-Tri	XLPE	B	0,85	1	2,5	29	0,21	0,09	**0,76**
CF3 - N	F1	FORCE BEDR. TYPE 2	2,00	0,80	1,00	1,60	230	7,73	Cu-Tri	XLPE	B	0,85	9	4	38	2,78	1,21	**1,88**
CF3 - N	F2	FORCE BEDR. TYPE 2	2,00	0,80	1,00	1,60	230	7,73	Cu-Tri	XLPE	B	0,85	9	4	38	2,39	1,04	**1,71**
CF3 - N	F3	FORCE BEDR. TYPE 1	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	2,5	29	2,39	1,04	**1,71**
CF3 - N	F4	FORCE BEDR. TYPE 1	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	2,5	29	1,91	0,83	**1,50**
CF3 - N	F5	FORCE BEDR. TYPE 1	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	2,5	29	1,43	0,62	**1,29**
CF3 - N	F6	FORCE BEDR. TYPE 1	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	2,5	29	0,95	0,41	**1,08**
CF3 - N	F7	FORCE F3	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	2,5	29	2,86	1,24	**1,91**
CF4 - N			**FLOOR 4 CHART NORMAL SUPPLY**															
CF4 - N	L1	ILLUM. DINING+CIRCUL	0,03	1,80	1,00	0,06	230	0,28	Cu-Tri	XLPE	B	0,85	0	2,5	29	0,14	0,06	**0,86**
CF4 - N	L2	ILLUM.CIRCULATION	0,03	1,80	1,00	0,06	230	0,28	Cu-Tri	XLPE	B	0,85	0	2,5	29	0,14	0,06	**0,86**
CF4 - N	L3	ILLUM.CIRCULATION	0,03	1,80	1,00	0,06	230	0,28	Cu-Tri	XLPE	B	0,85	0	2,5	29	0,14	0,06	**0,86**
CF4 - N	L4	ILLUM TOILET+WARE.	0,04	1,80	1,00	0,06	230	0,31	Cu-Tri	XLPE	B	0,85	0	2,5	29	0,15	0,07	**0,87**
CF4 - N	E1	ILLUM.EMERG.	0,09	1,80	1,00	0,16	230	0,78	Cu-Tri	XLPE	B	0,85	1	1,5	21	0,64	0,28	**1,08**
CF4 - N	CL1	FANCOIL	0,15	1,25	1,00	0,19	230	0,91	Cu-Tri	XLPE	B	0,85	1	2,5	29	0,22	0,10	**0,90**
CF4 - N	CL2	FANCOILS BEDROOMS	0,72	1,25	1,00	0,90	230	4,35	Cu-Tri	XLPE	B	0,85	5	2,5	29	1,43	0,62	**1,42**
CF4 - N	CL3	FANCOILS BEDROOMS	0,72	1,25	1,00	0,90	230	4,35	Cu-Tri	XLPE	B	0,85	5	2,5	29	2,15	0,93	**1,73**
CF4 - N	F1	FORCE BEDR. TYPE 2	2,00	0,80	1,00	1,60	230	7,73	Cu-Tri	XLPE	B	0,85	9	4	38	2,78	1,21	**2,01**
CF4 - N	F2	FORCE BEDR. TYPE 2	2,00	0,80	1,00	1,60	230	7,73	Cu-Tri	XLPE	B	0,85	9	4	38	2,39	1,04	**1,84**
CF4 - N	F3	FORCE BEDR. TYPE 1	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	2,5	29	2,39	1,04	**1,84**
CF4 - N	F4	FORCE BEDR. TYPE 1	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	2,5	29	1,91	0,83	**1,63**
CF4 - N	F5	FORCE BEDR. TYPE 1	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	2,5	29	1,43	0,62	**1,42**
CF4 - N	F6	FORCE BEDR. TYPE 1	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	2,5	29	0,95	0,41	**1,22**
CF4 - N	F7	FORCE F4	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	2,5	29	2,86	1,24	**2,05**
CF5 - N			**FLOOR 5 CHART NORMAL SUPPLY**															
CF5 - N	L1	ILLUM. DINING+CIRCUL	0,03	1,80	1,00	0,06	230	0,28	Cu-Tri	XLPE	B	0,85	0	2,5	29	0,14	0,06	**0,85**
CF5 - N	L2	ILLUM.CIRCULATION	0,03	1,80	1,00	0,06	230	0,28	Cu-Tri	XLPE	B	0,85	0	2,5	29	0,14	0,06	**0,85**
CF5 - N	L3	ILLUM.CIRCULATION	0,03	1,80	1,00	0,06	230	0,28	Cu-Tri	XLPE	B	0,85	0	2,5	29	0,14	0,06	**0,85**
CF5 - N	L4	ILLUM TOILET+WARE.	0,04	1,80	1,00	0,06	230	0,31	Cu-Tri	XLPE	B	0,85	0	2,5	29	0,15	0,07	**0,85**
CF5 - N	E1	ILLUM.EMERG.	0,02	1,80	1,00	0,03	230	0,13	Cu-Tri	XLPE	B	0,85	0	1,5	21	0,11	0,05	**0,83**
CF5 - N	CL1	FANCOIL	0,15	1,25	1,00	0,19	230	0,91	Cu-Tri	XLPE	B	0,85	1	2,5	29	0,22	0,10	**0,88**
CF5 - N	CL2	FANCOILS BEDROOMS	0,07	1,25	1,00	0,09	230	0,43	Cu-Tri	XLPE	B	0,85	1	2,5	29	0,14	0,06	**0,85**
CF5 - N	CL3	FANCOILS BEDROOMS	0,07	1,25	1,00	0,09	230	0,43	Cu-Tri	XLPE	B	0,85	1	2,5	29	0,21	0,09	**0,88**
CF5 - N	F1	FORCE BEDR. TYPE 2	2,00	0,80	1,00	1,60	230	7,73	Cu-Tri	XLPE	B	0,85	9	4	38	2,78	1,21	**2,00**
CF5 - N	F2	FORCE BEDR. TYPE 2	2,00	0,80	1,00	1,60	230	7,73	Cu-Tri	XLPE	B	0,85	9	4	38	2,39	1,04	**1,82**
CF5 - N	F3	FORCE BEDR. TYPE 1	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	2,5	29	2,39	1,04	**1,82**
CF5 - N	F4	FORCE BEDR. TYPE 1	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	2,5	29	1,91	0,83	**1,62**
CF5 - N	F5	FORCE BEDR. TYPE 1	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	2,5	29	1,43	0,62	**1,41**
CF5 - N	F6	FORCE BEDR. TYPE 1	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	2,5	29	0,95	0,41	**1,20**
CF5 - N	F7	FORCE F5	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	2,5	29	2,86	1,24	**2,03**
CF6 - N			**FLOOR 6 CHART NORMAL SUPPLY**															
CF6 - N	L1	ILLUM. EL.GR. + WAREHOUSE	0,02	1,80	1,00	0,03	230	0,14	Cu-Tri	XLPE	B	0,85	0	2,5	29	0,02	0,01	**1,15**
CF6 - N	L2	ILLUM.CIRCULATION	0,03	1,80	1,00	0,05	230	0,26	Cu-Tri	XLPE	B	0,85	0	2,5	29	0,11	0,05	**1,18**
CF6 - N	L3	ILLUM. LAUNDRY ROOM	0,01	1,80	1,00	0,01	230	0,06	Cu-Tri	XLPE	B	0,85	0	2,5	29	0,01	0,00	**1,14**
CF6 - N	E1	ILLUM.EMERG.	0,02	1,80	1,00	0,03	230	0,13	Cu-Tri	XLPE	B	0,85	0	1,5	21	0,09	0,04	**1,18**
CF6 - N	L4	ILLUM.RESERVE	0,17	1,80	1,00	0,31	230	1,51	Cu-Tri	XLPE	B	0,85	2	2,5	29	0,87	0,38	**1,52**
CF6 - N	L5	ILLUM.RESERVE	0,23	1,80	1,00	0,42	230	2,01	Cu-Tri	XLPE	B	0,85	2	2,5	29	1,16	0,50	**1,64**
CF6 - N	E2	ILLUM.EMERG.	0,02	1,80	1,00	0,03	230	0,13	Cu-Tri	XLPE	B	0,85	0	1,5	21	0,13	0,05	**1,19**
CF6 - N	F1	FORCE FLOOR	1,50	1,25	1,00	1,88	230	9,06	Cu-Tri	XLPE	B	0,85	11	2,5	29	1,49	0,65	**1,79**
CF6 - N	F2	FORCE RESERVE	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	2,5	29	3,34	1,45	**2,59**
CF6 - N	F3	FORCE RESERVE	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	2,5	29	3,34	1,45	**2,59**
CF6 - N	F4	FORCE RESERVE	1,50	0,80	1,00	1,20	230	5,80	Cu-Tri	XLPE	B	0,85	7	2,5	29	3,34	1,45	**2,59**
CF6 - N	R1	WASHING MACHINE 1	1,80	1,25	1,00	2,25	230	10,87	Cu-Tri	XLPE	B	0,85	13	4	38	1,12	0,49	**1,62**
CF6 - N	R2	WASHING MACHINE 2	1,80	1,25	1,00	2,25	230	10,87	Cu-Tri	XLPE	B	0,85	13	4	38	1,12	0,49	**1,62**
CF6 - N	R3	WASHING MACHINE 3	1,80	1,25	1,00	2,25	230	10,87	Cu-Tri	XLPE	B	0,85	13	4	38	1,12	0,49	**1,62**
CF6 - N	R4	WASHING MACHINE 4	1,80	1,25	1,00	2,25	230	10,87	Cu-Tri	XLPE	B	0,85	13	4	38	1,12	0,49	**1,62**
CF6 - N	EC	EXTRACTOR KITCHEN	4,00	1,25	1,00	5,00	400	8,02	Cu-Tri	XLPE	B	0,85	9	4	34	2,86	0,71	**1,85**
CF6 - N	EWC	EXTRACTOR TTOILETS	1,50	1,25	1,00	1,88	230	9,06	Cu-Tri	XLPE	B	0,85	11	4	38	3,73	1,62	**2,76**
CVENT - P			**GROUND FLOOR CHART NORMAL SUPPLY**															
CVENT - P	ESP	OVERPRESSION STAIRS	1,50	1,25	1,00	1,88	230	9,06	Cu-Tri	XLPE	B	0,85	11	4	38	3,73	1,62	**2,35**
CVENT - P	CL1	VENTILATOR 1	1,47	1,25	1,00	1,84	400	2,95	Cu-Tri	XLPE	B	0,85	3	2,5	25	1,68	0,42	**1,15**
CVENT - P	CL2	VENTILATOR 2	1,47	1,25	1,00	1,84	400	2,95	Cu-Tri	XLPE	B	0,85	3	2,5	25	1,68	0,42	**1,15**
CVENT - P	CL3	RECUPERATOR	0,18	1,25	1,00	0,23	230	1,09	Cu-Tri	XLPE	B	0,85	1	2,5	29	0,72	0,31	**1,04**
CVENT - P	CL4	RECUPERATOR	0,18	1,25	1,00	0,23	230	1,09	Cu-Tri	XLPE	B	0,85	1	2,5	29	0,72	0,31	**1,04**

Inside, task and activity type	*EM Lux*	*UGRL*	*RA*
TRAFFIC AREAS AND COMMON AREAS INSIDE BUILDINGS			
AREAS OF TRAFFIC			
Circulation areas and corridors	100	28	40
Stairs, escalators, conveyor	150	25	40
Loading ramps/sections	150	22	40
REST, HEALTH AND FIRST AID ROOMS			
Canteens, pantries	200	22	80
Rest rooms	100	22	80
Rooms for physical exercise	300	22	80
Changing rooms, wash rooms, bathrooms and services	200	25	80
Nursing	500	19	80
Rooms for medical care	500	16	90
CONTROL ROOMS			
Material, mechanisms rooms rooms	200	25	60
Room fax, post, picture of Accountants	500	19	80
STORAGE, COLD STORAGE ROOMS			
Warehouses and store room	100	25	60
Handling packages and delivery areas.	300	25	60
STORAGE WITH SHELVES			
Halls: without garnish	20	-	40
Halls: garnished	150	22	60
Control stations	150	22	60
INDUSTRIAL AND CRAFT ACTIVITIES			
POWER PLANTS			
Fuel supply plant	50	-	20
Accommodation in boiler	100	28	40
Engine rooms	200	25	80
Side rooms, for example pumps rooms, rooms of capacitors, etc.;			
Dashboards (inside buildings)	200	25	60
Control rooms	500	16	80
External switching devices	20	-	20
OFFICES			
File, copies, etc.	300	19	80
Writing, writing machine, reading, data processing	500	19	80
Technical drawing	750	16	80
CAD jobs	500	19	80
Conference and meeting rooms	500	19	80
Reception desk	300	22	80
Files	200	25	80
PLACES OF PUBLIC PREMISES			
COMMON AREAS			
Entrance halls	100	22	80
Wardrobes	200	25	80
Salons	200	22	80
Ticket offices	300	22	80
RESTAURANTS AND HOTELS			
Reception/box, Concierge	300	22	80
Kitchens	500	22	80
Restaurant, dining, meeting rooms	*[1]	*[1]	80
Self-service restaurant	200	22	80
Buffet	300	22	80
Conference room	500	19	80
Halls	100	25	80
THEATRES, CINEMAS, CONCERT HALLS			
Rehearsal rooms, dressing rooms	300	22	80
FAIRS, EXHIBITION HALLS			
General lighting	300	22	80
LIBRARIES			
Shelves	200	19	80

Reading area	500	19	80
Public service jobs	500	19	80
PARKING OF VEHICLES PUBLIC (INTERIOR)			
Ramp access or exit (of day)	300	25	20
Ramp access or exit (at night)	75	25	20
Streets of circulation	75	25	20
Parking areas	75	-	20
Box	300	19	80
* 1 the lighting should be designed to create the appropriate atmosphere			
EDUCATIONAL ESTABLISHMENTS			
KINDERGARTENS, NURSERIES			
Games rooms	300	19	80
Nursery	300	19	80
Craft room	300	19	80
EDUCATIONAL BUILDING			
Classrooms, classrooms for tutoring	300	19	80
Classrooms for evening classes and adult education	500	19	80
Reading room	500	19	80
Slate	500	19	80
Table shows	500	19	80
Art classrooms	500	19	80
Classrooms of art in art schools	750	19	90
Technical drawing classrooms	750	16	80
Classroom practices and laboratories	500	19	80
Classroom crafts	500	19	80
500 19 80 teaching workshops	500	19	80
Music practice rooms	300	19	80
Classrooms of computing practices	300	19	80
Laboratory of languages	300	19	80
Preparation classes and workshops	500	22	80
Entrance halls	200	22	80
Circulation areas, corridors	100	25	80
Stairs	150	25	80
Common classroom study and meeting rooms	200	22	80
Teachers room	300	19	80
Library: shelving	300	19	80
Library: reading rooms	500	19	80
Teachers material stores	100	25	80
Rooms of sports, gyms, swimming pools (general use)	300	22	80
School canteens	200	22	80
Kitchen	500	22	80
HEALTH FACILITIES			
ROOMS FOR GENERAL USE			
Waiting rooms	200	22	80
Corridors: during the day	200	22	80
Corridors: during the night	50	22	80
Day rooms	200	22	80
STAFF ROOMS			
Personnel office	500	19	80
Staff rooms	300	19	80
WARDS, MATERNITY WARDS			
General lighting	100	19	80
Reading lighting	300	19	80
Simple tests	300	19	80
Examination and treatment	1000	19	90
Illumination night, lighting of observation	5	-	80
Bathrooms and facilities for patients	200	22	80
ROOMS (OVERVIEW)			
General lighting	500	19	90
Examination and treatment	1000	19	90
EYE EXAM ROOMS			
General lighting	300	19	80
External eye exam	1000	-	90

Evidence of reading and color vision with vision diagrams	500	16	90
EAR EXAMINATION ROOMS			
General lighting	300	19	80
Ear examination	1000	-	90
SCANNER ROOMS			
General lighting	300	19	80
Scanners with breeders of images and TV systems	50	19	80
FARROWING			
General lighting	300	19	80
Examination and treatment	1000	19	80
(GENERAL) TREATMENT ROOMS			
Dialysis	500	19	80
Dermatology	500	19	90
Endoscopy rooms	300	19	80
Rooms of plaster casts	500	19	80
Medical baths	300	19	80
Massage and radiotherapy	300	19	80
AREAS OF OPERATION			
Preoperative and recovery rooms	500	19	90
Operating rooms	1000	19	90
Operating room	1000	19	90
INTENSIVE CARE UNIT			
General lighting	100	19	90
Simple tests	300	19	90
Examination and treatment	1000	19	90
Night surveillance	20	19	90
DENTISTS			
General lighting	500	19	90
In the patient	1000	-	90
Operating room	5000	-	90
Matched white dental	5000	-	90
LABORATORIES AND PHARMACIES			
General lighting	500	19	80
Inspection of colors	1000	19	90
DECONTAMINATION ROOMS			
Sterilization room	300	22	80
Disinfection rooms	300	22	80
AUTOPSY AND MORTUARY DEPOSIT ROOM			
General lighting	500	19	90
Autopsy and dissection table table	5000	-	90

	UP			LP			P1							P6		
ZONE	**SWIMMING POOL**	**FITNESS CENTER**	**CHANGING ROOM**	**MEETING SPACE**	**MULTIPURPOSE ROOM**	**CIRCULATION**	**MEETING ROOM**	**ROOM**	**OFFICE**	**CIRCULATION**	**KITCHEN**	**TERRACE**	**DINING ROOM**	**CIRCULATION**	**HAB TYPE 2**	**HAB TYPE 1**
Ems (lux)=	300	300	200	300	300	150	500	300	300	150	500	125	300	100	150	150
A (m2)=	128	58	10	70	35	35	26	15	35	35	30	40	94	42	21,5	15
Flux(lumen)=	1800	1200	2500	1200	1200	900	1200	1200	1200	900	2500	1200	1200	1000	1200	1200
Efficiency(%)=	0,8	0,8	0,7	0,8	0,8	0,8	0,8	0,8	0,8	0,8	0,7	0,8	0,8	0,7	0,8	0,8
Cu (utilization)=	0,8	0,8	0,7	0,8	0,8	0,8	0,8	0,8	0,8	0,8	0,85	0,8	0,8	0,8	0,8	0,8
fc(factor conserv)=	1	1	1	0,85	1	0,8	1	0,8	0,9	0,8	1	0,8	1	1	1	1
N (n° lamps)=	33	23	2	32	14	11	17	7	15	11	10	8	37	8	4	3
N (n° luminaries)=	**17**	**11**	**1**	**16**	**7**	**6**	**8**	**4**	**8**	**6**	**5**	**4**	**18**	**8**	**2**	**1**
N° lum/lamp	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2
ELECTION	2*26	2*18	2*36F	2*18	2*18	2*13	2*18	2*18	2*18	2*13	2*36	2*18	2*18	1*18	2*18	2*18

LUMENS

LINEAL LAMPS		LUMENS	EFFICIENCY	
18W	L=590	1000	0,7	
36W	L=1200	2500	0,7	
58W	L=1500	4000	0,7	
COMPACT LAMPS				
5W	25W	250	0,8	
7W	40W	400	0,8	
9W	60W	600	0,8	
11W	75W	900	0,8	2*13
18W	100W	1200	0,8	2*18
24W	150W	1800	0,8	2*26
36W	200W	2900	0,8	32
40W	>200W	3500	0,8	42

$$n = \frac{E \times S}{Cu \times Cd \times \phi}$$

1 lx =
1 lm/m2

LAMPARAS BT	halogena	dicroica (30º)
20w	330	320
35w		620
50w	1000	970
75w		1300
100w	2300	2000
150w	3200	

DESCHARGE LAMPS

	HIT-DE		HIE(BULBO)	
70W	5000	0,7	5000	0,6
100W			8000	0,8
150W	11000	0,7	12500	0,8
250W	20000	0,8		
400W	36000	0,8		

INCANDESCENT LAMPS

40 W	400
60W	600
100W	1000

BASES AND ILLUMINATION CALCULATIONS

Bases and calculations of lighting
For lighting calculations the following formula has been used:

$$\phi = \frac{E \times S}{Cu \times Cd}$$

where:
f = Luminous flux in lm.
E = Illuminance at lx.
S = Area of the premises in m².
Cu = Coefficient of use.
Cd = Coefficient of appreciation.

As in fact the number of luminaries necessary for a given
Illuminance, the previous formula becomes the following:

$$n = \frac{E \times S}{Cu \times Cd \times \phi}$$

n = Number of luminaries.
f1 = luminous flux of the luminaire.

The depreciation coefficient, also called the maintenance factor, has
the loss of luminous flux of the lamps due to aging
as by the dust or dirt that may be deposited in them, and the loss of reflection
of the reflector or diffuser also caused by dirt.
The values generally used for the depreciation coefficient range between 0.5 and
0.9; The highest value corresponds to facilities located in clean premises, with
frequent changes of the lamps and with an effective maintenance, while the
lowest value corresponds to environment premises with dust and dirt, with cleaning
Uncommon and maintenance of the installation difficult.
The coefficient of use is obtained through tables and is a function of the type of
luminaire, the reflection coefficients of the walls of the premises and the local index. East
Local index is obtained from the value of the constant K, defined by the formulas:
Direct and semi-direct lighting:

$$K = \frac{1 \times a}{hu \times (1 + a)}$$

Indirect lighting:

$$K = \frac{3 \times l \times a}{2 \times hu \times (1 + a)}$$

where:
l = Length of the premises.
a = Width of the room.
hu = Useful height (mounting height of the luminaire minus the height of the work plane).

With the value of the constant K, the value of the local index is obtained by means of the table
following:

Valor de K	Índice del local
<0,7	0,6
0,7 a 0,9	0,8
0,9 a 1,12	1
1,12 a 1,38	1,25
1,38 a 1,75	1,5

1,75 a 2,25	2
2,25 a 2,75	2,5
2,75 a 3,50	3
3,50 a 4,50	4
>4,50	5

The forecasts for the calculation of the lighting of the premises, stairs, corridors and diverse dependencies, have been based on the CEI and UNE recommendations on:

· Level and uniformity of illuminances.
· Classification of luminaires according to BZ and UNE.
· Light control.
· Glare control.

RESIDUALS

DOWN PIPE (RE1)

LEVEL	TYPE OF EQUIPMENTS																						Nº PIECES	q LEVEL	K	Q l/s
	HAND WASHER UTS	qt l/s 0,60	q	WC UTS	qt l/s 1,20	q	BATH UTS	qt l/s 1,10	q	SHOWER UTS	qt l/s 0,30	q	WASHING MACHINE UTS	qt l/s 1,40	q	KITCHEN SINK UTS	qt l/s 0,90	q	SINK UTS	qt l/s 0,47	q	DUMP UTS	qt l/s 0,47	q				
P06																										
P05			0,00			0,00			0,00			0,00			0,00			0,00			0,00	1,00		0,47	1,00	0,47	1,070	0,503
P04			0,00			0,00			0,00			0,00			0,00			0,00			0,00	1,00		0,47	1,00	0,47	1,070	0,503
P03	6,00		3,60			0,00			0,00			0,00			0,00			0,00			0,00	1,00		0,47	7,00	4,07	0,478	1,946
P02	2,00		1,20	2,00		2,40	0,00		0,00			0,00			0,00	1,00		0,90			0,00	1,00		0,47	6,00	4,97	0,517	2,571
P01	1,00		0,60	1,00		1,20	0,00		0,00			0,00			0,00			0,00			0,00			0,00	2,00	1,80	1,070	1,926
P00	1,00		0,60	1,00		1,20	0,00		0,00	1,00		0,30			0,00			0,00	1,00		0,47			0,00	4,00	2,57	0,647	1,664
PS1																										

Q TOTAL	9,113

DOWN PIPE (RE2)

LEVEL	TYPE OF EQUIPMENTS																						Nº PIECES	q LEVEL	K	Q l/s
	HAND WASHER UTS	qt l/s 0,60	q	WC UTS	qt l/s 1,20	q	BATH UTS	qt l/s 1,10	q	SHOWER UTS	qt l/s 0,30	q	WASHING MACHINE UTS	qt l/s 1,40	q	KITCHEN SINK UTS	qt l/s 0,90	q	SINK UTS	qt l/s 0,47	q	DUMP UTS	qt l/s 0,47	q				
P06			0,00			0,00			0,00			0,00			0,00			0,00	2,00		0,94			0,00	2,00	0,94	1,070	1,006
P05	2,00		1,20	2,00		2,40			0,00	2,00		0,60			0,00			0,00	2,00		0,94			0,00	8,00	5,14	0,448	2,303
P04	2,00		1,20	2,00		2,40			0,00	2,00		0,60			0,00			0,00	2,00		0,94			0,00	8,00	5,14	0,448	2,303
P03	2,00		1,20	2,00		2,40			0,00	2,00		0,60			0,00			0,00	3,00		1,41			0,00	9,00	5,61	0,424	2,376
P02																										
P01																										
P00																										
PS1																										

Q TOTAL	7,987

DOWN PIPE (RE3)

LEVEL	TYPE OF EQUIPMENTS																						Nº PIECES	q LEVEL	K	Q l/s
	HAND WASHER UTS	qt l/s 0,60	q	WC UTS	qt l/s 1,20	q	BATH UTS	qt l/s 1,10	q	SHOWER UTS	qt l/s 0,30	q	WASHING MACHINE UTS	qt l/s 1,40	q	KITCHEN SINK UTS	qt l/s 0,90	q	SINK UTS	qt l/s 0,47	q	DUMP UTS	qt l/s 0,47	q				
P06																										
P05																										
P04																										
P03	6,00		3,60			0,00			0,00			0,00			0,00			0,00			0,00			0,00	6,00	3,60	0,517	1,862
P02			0,00			0,00			0,00			0,00			0,00	3,00		2,70			0,00			0,00	3,00	2,70	0,777	2,098

Q TOTAL	3,960

DOWN PIPE (RE4)

LEVEL	TYPE OF EQUIPMENTS																						Nº PIECES	q LEVEL	K	Q l/s
	HAND WASHER UTS	qt l/s 0,60	q	WC UTS	qt l/s 1,20	q	BATH UTS	qt l/s 1,10	q	SHOWER UTS	qt l/s 0,30	q	WASHING MACHINE UTS	qt l/s 1,40	q	KITCHEN SINK UTS	qt l/s 0,90	q	SINK UTS	qt l/s 0,47	q	DUMP UTS	qt l/s 0,47	q				
P06			0,00	0,00		0,00			0,00			0,00	3,00		4,20			0,00	1,00		0,47	1,00		0,47	5,00	5,14	0,570	2,930
P05			0,00	0,00		0,00			0,00			0,00			0,00	1,00		0,90			0,00			0,00	1,00	0,90	1,070	0,963
P04			0,00	0,00		0,00			0,00			0,00			0,00	1,00		0,90			0,00			0,00	1,00	0,90	1,070	0,963
P03			0,00	0,00		0,00			0,00			0,00			0,00	1,00		0,90	0,00		0,00			0,00	1,00	0,90	1,070	0,963
P02																												
P01																												
P00																												
PS1																												

Q TOTAL	5,819

DOWN PIPE (RE5)

LEVEL	TYPE OF EQUIPMENTS																						Nº PIECES	q LEVEL	K	Q l/s
	HAND WASHER UTS	qt l/s 0,60	q	WC UTS	qt l/s 1,20	q	BATH UTS	qt l/s 1,10	q	SHOWER UTS	qt l/s 0,30	q	WASHING MACHINE UTS	qt l/s 1,40	q	KITCHEN SINK UTS	qt l/s 0,90	q	SINK UTS	qt l/s 0,47	q	DUMP UTS	qt l/s 0,47	q				
P06																												
P05	1,00		0,60																						1,00	0,60	1,070	0,642
P04	1,00		0,60																						1,00	0,60	1,070	0,642
P03																												
P02																												
P01																												
P00																												
PS1																												

Q TOTAL	1,284

DOWN PIPE (RE6)

LEVEL	TYPE OF EQUIPMENTS																						Nº PIECES	q LEVEL	K	Q l/s
	HAND WASHER UTS	qt l/s 0,60	q	WC UTS	qt l/s 1,20	q	BATH UTS	qt l/s 1,10	q	SHOWER UTS	qt l/s 0,30	q	WASHING MACHINE UTS	qt l/s 1,40	q	KITCHEN SINK UTS	qt l/s 0,90	q	SINK UTS	qt l/s 0,47	q	DUMP UTS	qt l/s 0,47	q				
P06																												
P05	1,00		0,60			0,00			0,00			0,00			0,00			0,00			0,00			0,00	1,00	0,60	1,070	0,642
P04	1,00		0,60			0,00			0,00			0,00			0,00			0,00			0,00			0,00	1,00	0,60	1,070	0,642
P03																												
P02																												
P01																												
P00																												
PS1																												

Q TOTAL	1,284

DOWN PIPE (RE7)

LEVEL	TYPE OF EQUIPMENTS																				Nº PIECES	q LEVEL	K	Q l/s
	HAND WASHER UTS	qt l/s 0,60	q	WC UTS	qt l/s 1,20	q	BATH UTS	qt l/s 1,10	q	SHOWER UTS	qt l/s 0,30	q	WASHING MACHINE UTS	qt l/s 1,40	q	KITCHEN SINK UTS	qt l/s 0,90	q	SINK UTS	qt l/s 0,47	q	DUMP UTS	qt l/s 0,47	q				
P06																								
P05	1,00		0,60			0,00			0,00			0,00			0,00			0,00			0,00			0,00	1,00	0,60	1,070	0,642
P04	1,00		0,60			0,00			0,00			0,00			0,00			0,00			0,00			0,00	1,00	0,60	1,070	0,642
P03																								
P02																								
P01																								
P00																								
PS1																								

Q TOTAL	1,284

DOWN PIPE (RE8)

LEVEL	TYPE OF EQUIPMENTS																				Nº PIECES	q LEVEL	K	Q l/s
	HAND WASHER UTS	qt l/s 0,60	q	WC UTS	qt l/s 1,20	q	BATH UTS	qt l/s 1,10	q	SHOWER UTS	qt l/s 0,30	q	WASHING MACHINE UTS	qt l/s 1,40	q	KITCHEN SINK UTS	qt l/s 0,90	q	SINK UTS	qt l/s 0,47	q	DUMP UTS	qt l/s 0,47	q				
P06																								
P05	1,00		0,60			0,00			0,00			0,00			0,00			0,00			0,00			0,00	1,00	0,60	1,070	0,642
P04	1,00		0,60			0,00			0,00			0,00			0,00			0,00			0,00			0,00	1,00	0,60	1,070	0,642
P03																								
P02																								
P01																								
P00																								
PS1																								

Q TOTAL	1,284

DOWN PIPE (RE9)

LEVEL	TYPE OF EQUIPMENTS																				Nº PIECES	q LEVEL	K	Q l/s
	HAND WASHER UTS	qt l/s 0,60	q	WC UTS	qt l/s 1,20	q	BATH UTS	qt l/s 1,10	q	SHOWER UTS	qt l/s 0,30	q	WASHING MACHINE UTS	qt l/s 1,40	q	KITCHEN SINK UTS	qt l/s 0,90	q	SINK UTS	qt l/s 0,47	q	DUMP UTS	qt l/s 0,47	q				
P06																								
P05	1,00		0,60			0,00			0,00			0,00			0,00			0,00			0,00			0,00	1,00	0,60	1,070	0,642
P04	1,00		0,60			0,00			0,00			0,00			0,00			0,00			0,00			0,00	1,00	0,60	1,070	0,642
P03																								
P02																								
P01																								
P00																								
PS1																								

Q TOTAL	1,284

DOWN PIPE (RE10)

LEVEL	TYPE OF EQUIPMENTS																				Nº PIECES	q LEVEL	K	Q l/s
	HAND WASHER UTS	qt l/s 0,60	q	WC UTS	qt l/s 1,20	q	BATH UTS	qt l/s 1,10	q	SHOWER UTS	qt l/s 0,30	q	WASHING MACHINE UTS	qt l/s 1,40	q	KITCHEN SINK UTS	qt l/s 0,90	q	SINK UTS	qt l/s 0,47	q	DUMP UTS	qt l/s 0,47	q				
P06																								
P05	2,00		1,20			0,00			0,00			0,00			0,00			0,00			0,00			0,00	2,00	1,20	1,070	1,284
P04	2,00		1,20			0,00			0,00			0,00			0,00			0,00			0,00			0,00	2,00	1,20	1,070	1,284
P03	2,00		1,20			0,00			0,00			0,00			0,00			0,00			0,00			0,00	2,00	1,20	1,070	1,284
P02																								
P01																								
P00																								
PS1																								

Q TOTAL	3,852

CATCH BASIN 1	RE1		9,11	l/s
PUMPING	RE2		7,98	l/s
	RE3		3,96	l/s
		Q	21,05	l/s
CATCH BASIN 2	1,00	HAND WASHER	0,60	l/s
PUMPING	1,00	WC	1,20	l/s
	1,00	SINK	0,47	l/s
		Q	2,27	l/s
RE4			5,81	l/s
TO NETWORK				
CATCH BASIN 3	2,00	HAND WASHER	0,60	l/s
PUMPING	2,00	WC	1,20	l/s
	2,00	SHOWER	0,30	l/s
	2,00	SINK	0,47	l/s
		Q	2,57	l/s
RE10			3,85	l/s
TO NETWORK				

If Ne is greater that Na, will be required the installation of a lightning protection system							
FREQUENCY EXPECTED OF IMPACTS				**TOLERABLE RISK**			
$Ne = Ng*Ae*C_1*10^{-6}$				**$Na = 5,5 * 10^{-3}/C_2 * C_3 *_4 C *_5 C$**			
Ng =	Impact density in the field (No. impacts/year km^2))	=	4	C_2 =	Coefficient depending on type of construction	=	1
Ae =	Capture surface in m^2, is the bounded by the line drawn at a distance of 3 H of each one of the points on the perimeter of the building, H is the height of the building at the point of the considered perimeter.	=	27400	C_3 =	Coefficient depending on content of the building	=	1
				C_4 =	Coefficient according to use of the building	=	3
C_1 =	Coefficient related to the environment, according to table.	=	0.5	C_5 =	Coefficient as a function of the need of continuity	=	1
		Ne =	0,0548			**Na** =	0,0165

NEED LIGHTNING

DENSITY MAP OF IMPACTS IN THE LAND

C1 COEFFICIENT TABLE	
Situation of the building	**C1**
Near to other buildings or trees of the same height or tallers	0,5
Rodeated of small buildings	0,75
Isolated	1
Isolated on a hill	2

COEFFICIENT C2 TABLE			
	Metallic roof	**Concrete roof**	**Wood roof**
Metallic structure	0,5	1	2
Cconcrete structure	1	1	2,5
Wood structure	2	2,5	3
COEFFICIENT C3 TABLE			
Building with flammable content			3
Another contents			1
COEFFICIENT C4 TABLE			
Buildings withou occupation normally			0,5
Public concurrence uses, snaitary, comercial, education			3
Rest of buildings			1
COEFFICIENT C5 TABLE			
Buildings whose deterioration could interrupt an essential service or could cause a serious environmental impact			5
Rest of buildings			1